USER MANUAL

VB8004

Mini-ITX Mainboard

1.10-08022011-100800

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Regulatory Compliance

FCC-A Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his personal expense.

Notice 1

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Notice 2

Shielded interface cables and A.C. power cord, if any, must be used in order to comply with the emission limits.

Tested To Comply
With FCC Standards
FOR HOME OR OFFICE USE

Battery Recycling and Disposal

- ☐ Only use the appropriate battery specified for this product.
- ☐ Do not re-use, recharge, or reheat an old battery.
- ☐ Do not attempt to force open the battery.
- ☐ Do not discard used batteries with regular trash.
- ☐ Discard used batteries according to local regulations.

Safety Precautions

- ☐ Always read the safety instructions carefully.
- ☐ Keep this User's Manual for future reference.
- ☐ All cautions and warnings on the equipment should be noted.
- ☐ Keep this equipment away from humidity.
- ☐ Lay this equipment on a reliable flat surface before setting it up.
- ☐ Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
- ☐ Place the power cord in such a way that people cannot step on it.
- ☐ Always unplug the power cord before inserting any add-on card or module.
- ☐ If any of the following situations arises, get the equipment checked by authorized service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated into the equipment.
  - The equipment has been exposed to moisture.
  - The equipment has not worked well or you cannot get it work according to User's Manual.
  - The equipment has dropped and damaged.
  - The equipment has obvious sign of breakage.
- ☐ Do not leave this equipment in an environment unconditioned or in a storage temperature above 60°C (140°F). The equipment may be damaged.
- ☐ Do not leave this equipment in direct sunlight.
- ☐ Never pour any liquid into the opening. Liquid can cause damage or electrical shock.
- ☐ Do not place anything over the power cord.
- ☐ Do not cover the ventilation holes. The openings on the enclosure protect the equipment from overheating

Box Contents and Ordering Information

VB8004-16X SKU

- ☐ 1 x VB8004 mainboard (with Nano X2 1.6 GHz processor)
- ☐ 1 x SATA cable
- ☐ 1 x SATA power cable
- ☐ 1 x Driver CD
- ☐ 1 x AC-to-DC adapter (optional)

VB8004-16XS SKU

- ☐ 1 x VB8004 mainboard (with Nano X2 1.6 GHz processor)
- ☐ 1 x VB8004-A daughter board
- ☐ 1 x SATA cable
- ☐ 1 x SATA power cable
- ☐ 1 x Driver CD
- ☐ 1 x AC-to-DC adapter (optional)

VB8004-16S SKU

- ☐ 1 x VB8004 mainboard (with Nano 1.6 GHz processor)
- ☐ 1 x VB8004-A daughter board
- ☐ 1 x SATA cable
- ☐ 1 x SATA power cable
- ☐ 1 x Driver CD
- ☐ 1 x AC-to-DC adapter (optional)

VB8004-16 SKU

- ☐ 1 x VB8004 mainboard (with Nano 1.6 GHz processor)
- ☐ 1 x SATA cable
- ☐ 1 x SATA power cable
- ☐ 1 x Driver CD
- ☐ 1 x AC-to-DC adapter (optional)

VB8004-12E SKU

- ☐ 1 x VB8004 mainboard (with Nano 1.2 GHz processor)
- ☐ 1 x SATA cable
- ☐ 1 x SATA power cable
- ☐ 1 x Driver CD
- ☐ 1 x AC-to-DC adapter (optional)

Note:

The VB8004-16S and VB8004-16XS SKU are only for project base and not for a standard Stock-keeping Unit.

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1. Product Overview

The VIA VB8004 Mini-ITX mainboard is a highly integrated x86 mainboard optimized for systems in ultra-thin embedded, industrial and multimedia applications. The mainboard is based on the low power VIA VX900 Unified Digital Media IGP chipset that features the VIA Chrome9™ HC DX9 with 2D/3D graphics and video accelerators for rich digital media performance.

The VIA VB8004 has one expansion I/O daughter board called VB8004-A. The VB8004-A daughter board is connected through a proprietary 80-pin connector that carries signals for one 4-Lane PCIe, one 1-Lane PCIe, dedicated graphics S3 5400E, HDMI, and DVI-I. The combination of mainboard and daughter board offers up to four displays that makes it ideal for various digital signages and perfect for gaming.

The VIA VB8004 includes a powerful, secure, and efficient VIA Nano™ X2 / Nano™ processor. The VIA Nano X2 / Nano processor includes the VIA Padlock Security Engine, VIA CoolStream™ Architecture, VIA StepAhead™ Technology Suite, and VIA TwinTurbo™ technology.

The VIA VB8004 includes one 1066 MHz DDR3 SODIMM slot that supports up to 4 GB memory size. The VIA VB8004 provides support for high fidelity audio with its included VIA VT1708S High Definition Audio codec. In addition it supports two SATA 3Gb/s storage devices.

The VIA VB8004 is fully compatible with Microsoft® and Linux operating systems, as well as with standard Mini-ITX chassis enclosures. However, the length of I/O coastline of VB8004 mainboard is non-standard; therefore a customized I/O bracket is necessary.

> **Note:**
>
> The VB8004 Mini-ITX mainboard does not include an I/O bracket due to the non-standard length of the I/O coastline. All users should check with the local sales representative for I/O brackets customization details.

1.1. Key Features and Benefits

1.1.1. VIA Nano™ X2 / Nano™ Processor

The VIA Nano X2 and VIA Nano are 64-bit superscalar x86 processors based on a 40 nanometer and 65 nanometer process technology respectively. Packed into an ultra compact NanoBGA2 package (measuring 21mm x 21mm), it delivers an energy-efficient yet powerful performance, with cool and quiet operation. The VIA Nano X2 and VIA Nano are ideal for embedded system applications such as industrial PCs, test machines, measuring equipment, digital signage, medical PCs, monitoring systems, gaming machines, in-vehicle entertainment, etc.

1.1.2. VIA VX900 Chipset

The VIA VX900 Unified Digital Media IGP Chipset is designed to enable high quality digital video streaming and DVD playback in a new generation of fanless, small form factor PCs and IA devices. The VIA VX900 features VIA Chrome9™ HC DX9 2D/3D graphics and video acceleration, VC1, MPEG-2, WMV9, H.264 decoding acceleration, DDR3 1066 MHz support, motion compensation and dual display support to ensure a rich overall entertainment experience.

1.1.3. DC-In Power Input

The VIA VB8004 comes with DC-in power input jack. The DC-in power input requires a 12V/5A max input. The AC-to-DC adapter can be purchased with the mainboard.

1.1.4. Expansion Option

The VIA VB8004 further proves its versatility by providing a unique expansion option that uses a proprietary 80-pin connector for daughter board. The VB8004-A daughter board provides additional graphics support for the VB8004 mainboard. With the additional DVI-I and HDMI ports on the VB8004-A, the VB8004 mainboard can support up to four displays. In addition, the

VB8004-A daughter board has a Mini PCI Express slot to support an optional WLAN or 3G/4G module.

1.2. Product Specifications

- **Processor**
  - VIA Nano X2 40nm processor
    - 1.6 GHz VIA Nano X2 (for VB8004-16X SKU[1] and VB8004-16XS SKU[2])
  - VIA Nano E-Series 65nm processor
    - 1.6 GHz VIA Nano (for VB8004-16S SKU[3] and VB8004-16 SKU[4])
    - 1.2 GHz VIA Nano (for VB8004-12E SKU[5])
  - Supports 800MHz Front Side Bus
  - 7 bit VID VRM Operation
  - 21 x 21 mm FCBGA

- **Chipset**
  - VIA VX900 Unified Digital Media IGP chipset
  - 31 x 31 mm FCBGA

- **System Memory**
  - 1 x SODIMM slot supporting DDR3 1066 MHz SDRAM
  - Supports up to 4 GB memory size

- **Graphics**
  - Integrated VIA Chrome9™ HC DX9 3D/2D graphics
  - MPEG2, WMV9/VC1, H.264 Full HD video decoder
  - DirectX 9 support

- **Onboard Peripherals**
  - **Onboard USB**
    - VL801 USB 3.0 controller (manufacturing option)
  - **Onboard LAN**
    - VIA VT6130 PCI Express Gigabit Ethernet controller
  - **Onboard Audio**
    - VIA VT1708S High Definition Audio Codec
  - **Onboard Super IO**
    - Fintek F81801U-I Super I/O controller

- **Onboard I/O Connectors**
  - 4 x USB 2.0 pin header
  - 1 x Audio pin header for Line-out and MIC-in
  - 1 x Digital I/O (GPI x 4 + GPO x 4)
  - 1 x LPC connector for BIOS debugging
  - 1 x Serial connector for COM port
  - 2 x COM port voltage select pin header
  - 1 x Panel and Back Light power select pin header
  - 1 x Front panel pin header
  - 1 x CPU/System fan connector
  - 1 x SPI Flash ROM pin header
  - 1 x OPTO Out pin header (SPDIF_Out)
  - 2 x SATA HDD connectors
  - 2 x SATA HDD power connectors
  - 1 x Proprietary 80-pin I/O connector
  - 1 x LVDS connector, for 24-bit single channel LVDS panel

- **Back Panel I/O**
  - 1 x 12V DC-in power jack
  - 1 x PS/2 Keyboard port
  - 1 x PS/2 Mouse port
  - 1 x RJ45 port (GigaLAN)
  - 2 x USB 2.0 ports
  - 1 x Serial port (COM port)
  - 1 x DVI-I port
  - 2 x USB 3.0 ports (manufacturing option)
  - 1 x HDMI port

- **BIOS**
  - AMI BIOS
  - 8 Mbit SPI flash memory

- **Supported Operating System**
  - Windows 7
  - Windows Embedded Standard 7
  - Windows XP
  - Windows Embedded Standard/Compact
  - Linux

- **Power**
  - DC-in 12V

- **System Monitoring & Management**
  - Wake-on-LAN
  - Keyboard Power-on
  - Timer Power-on
  - System power management
  - AC power failure recovery
  - WatchDog Timer

- **Operating Conditions**
  - **Operating Temperature**
    - 0°C up to 50°C
  - **Operating Humidity**
    - 0% up to 95% (relative humidity; non-condensing)

- **Form Factor**
  - Mini-ITX (6-layer)
  - 17 cm x 17 cm

- **Compliance**
  - CE
  - FCC
  - BSMI
  - RoHS

Notes:

1. The VB8004-16X SKU uses heatsink with fan and has LVDS connector but does not support the VB8004-A daughter board.
2. The VB8004-16XS SKU supports VB8004-A daughter board, LVDS connector and uses heatsink with fan.
3. The VB8004-16S SKU supports VB8004-A daughter board, LVDS connector and uses heatsink with fan.
4. The VB8004-16 SKU uses heatsink with fan and has LVDS connector but does not support the VB8004-A daughter board.
5. The VB8004-12E SKU is a fanless and has LVDS connector but does not support the VB8004-A daughter board.

1.3. Layout Diagram

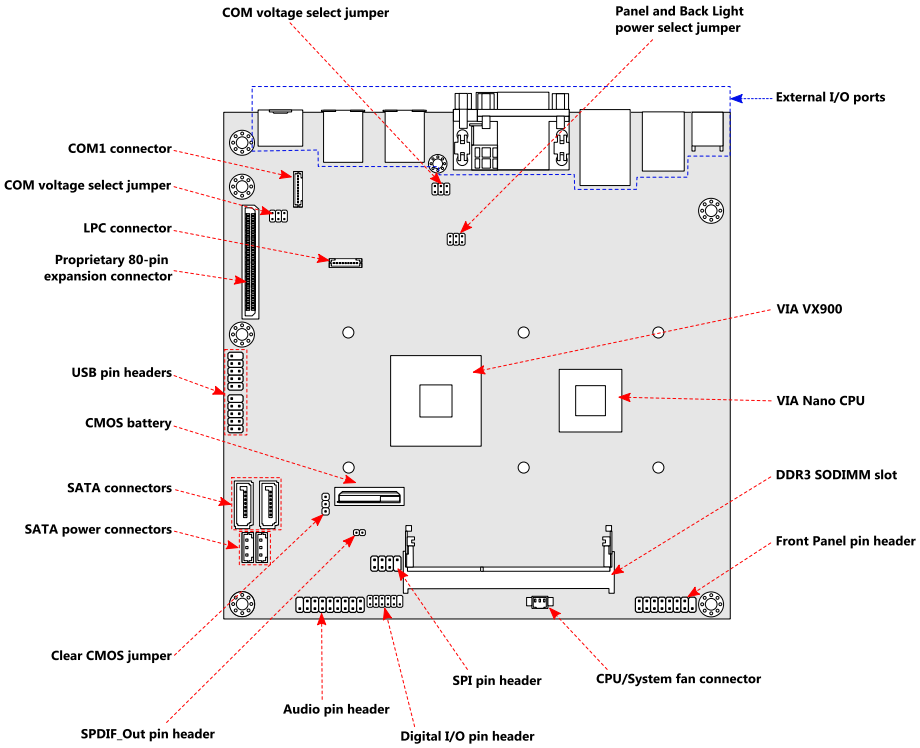


Figure 1: VB8004 mainboard top view layout

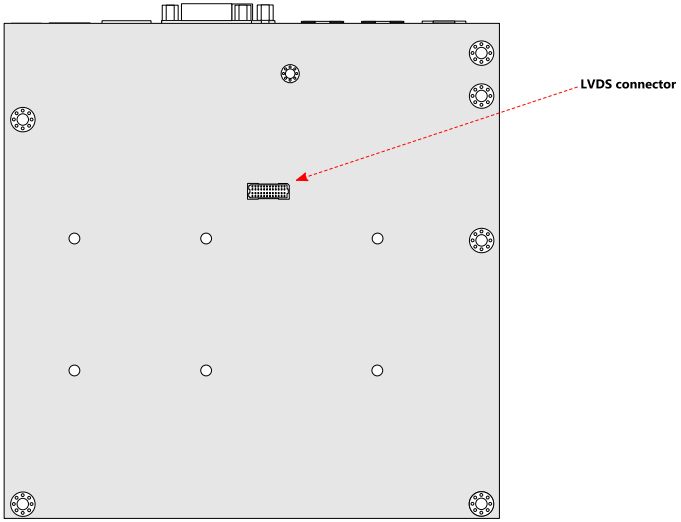


Figure 2: VB8004 mainboard bottom view layout

1.4. Product Dimensions

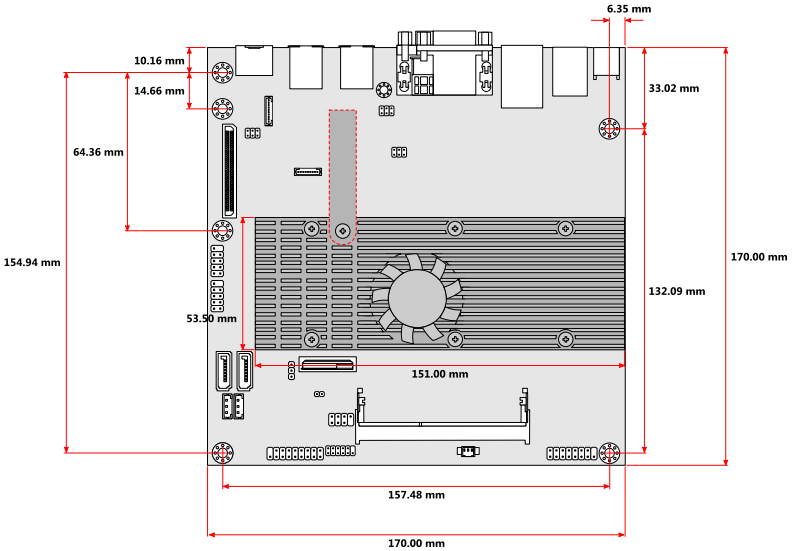


Figure 3: Dimensions of the VB8004 mainboard (VB8004-16 SKU)

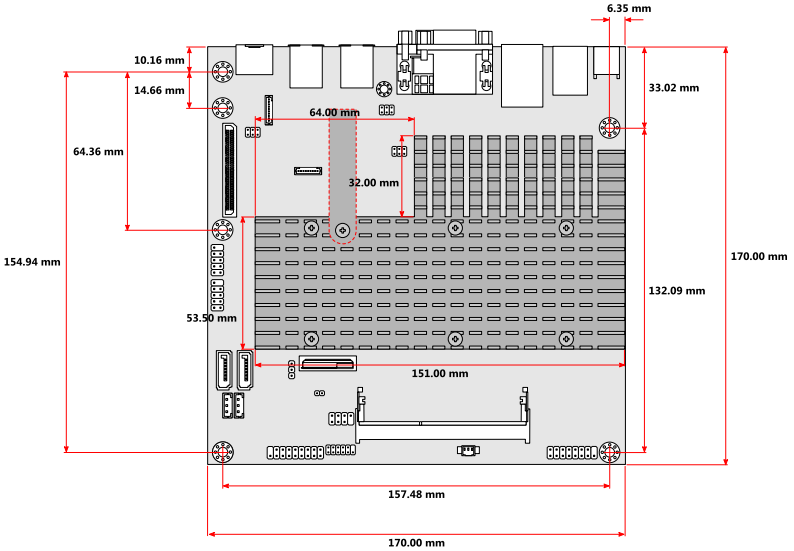


Figure 4: Dimensions of the VB8004 mainboard (VB8004-12E SKU)

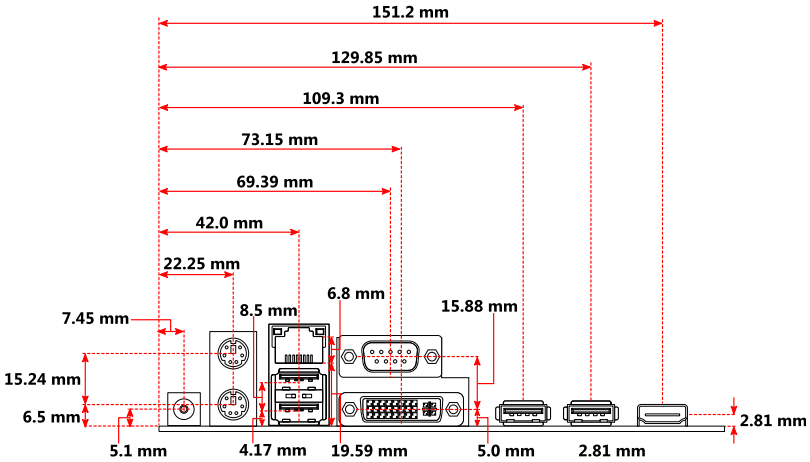


Figure 5: Dimensions of the VB8004 mainboard I/O

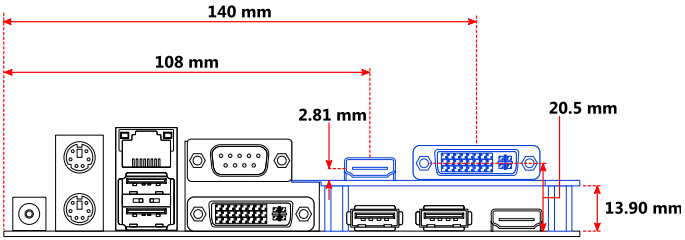


Figure 6: Dimensions of the VB8004 with VB8004-A daughter board I/O

1.5. Height Distribution

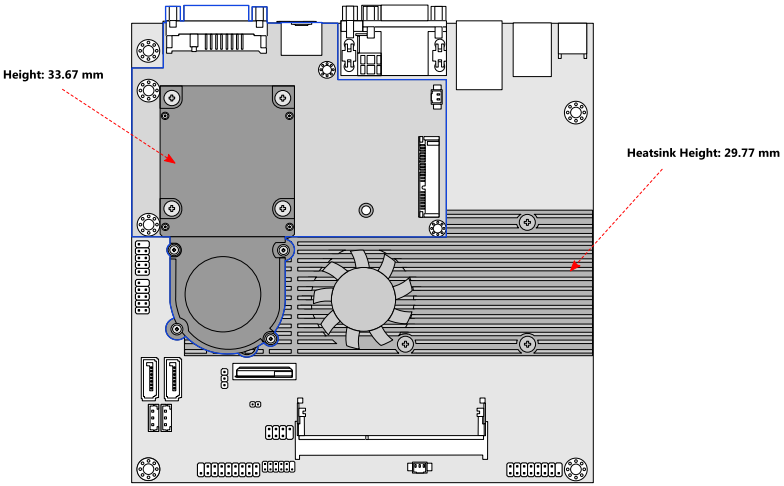


Figure 7: Height distribution of VB8004 mainboard (VB8004-16S SKU)

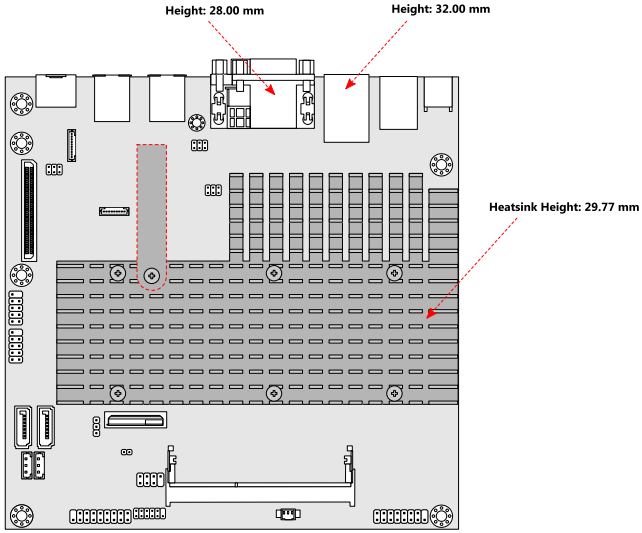


Figure 8: Height distribution of VB8004 mainboard (VB8004-12E SKU)

2. I/O Interface

The VIA VB8004 mainboard has a wide selection of interfaces integrated into the board. It includes a selection of frequently used ports as part of the external I/O coastline.

2.1. External I/O Ports

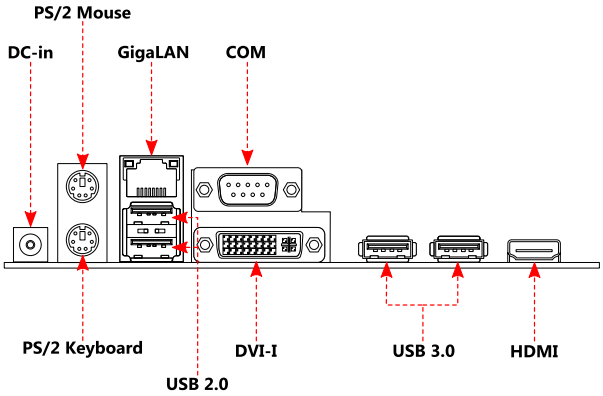


Figure 9: I/O ports of VB8004 mainboard

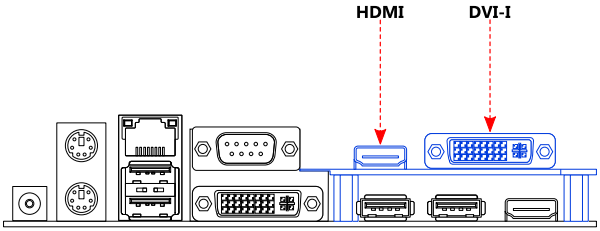


Figure 10: I/O ports of VB8004 mainboard with VB8004-A daughter board

Note:

The VB8004-A daughter board is supported only in VB8004-16XS and VB8004-16S SKU.

2.1.1. DC-in Jack

The VB8004 mainboard comes with a DC-in coaxial power connector. The specifications of the DC coaxial power connector are shown below

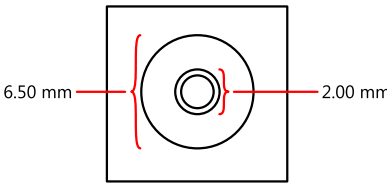


Figure 11: DC-in coaxial connector

Physical Specifications	
Outer Diameter	6.50 mm
Inner Diameter	2.00 mm
Barrel Depth	8.80 mm
Electrical Specifications	
Input Voltage	12 V
Input Current	5.0 A (max)

Table 1: DC-in coaxial connector specifications

Note:

The plug of the power adapter must have an inner diameter of 2.10 mm in order to fit the DC-in coaxial connector properly.

2.1.2. PS/2 Port

The mainboard provides two PS/2 ports. The green PS/2 port is used to attach a PS/2 mouse while the purple PS/2 port is for a PS/2 keyboard. The pinout of the PS/2 port is as shown below

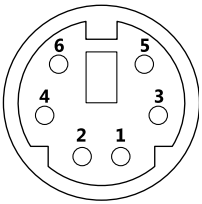


Figure 12: PS/2 port pin diagram

Pin	Signal
1	+Data
2	NC
3	GND
4	+5V
5	+CLK
6	NC

Table 2: PS/2 port pinout

2.1.3. GigaLAN Port

The integrated 8-pin Gigabit Ethernet port is using an 8 Position 8 Contact (8P8C) receptacle connector (commonly referred to as RJ45). The pinout of the Gigabit Ethernet port is as shown below.

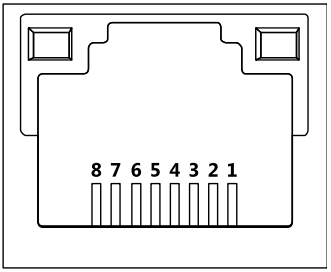


Figure 13: Gigabit Ethernet port pinout diagram

Pin	Signal
1	Signal pair 1+
2	Signal pair 1-
3	Signal pair 2+
4	Signal pair 3+
5	Signal pair 3-
6	Signal pair 2-
7	Signal pair 4+
8	Signal pair 4-

Table 3: Gigabit Ethernet port pinout

2.1.4. USB 2.0 Port

The VB8004 mainboard provides two USB 2.0 ports located below the GigaLAN port at the back panel I/O. The USB 2.0 gives complete Plug & Play and hot swapping external devices. Each USB 2.0 port is using the USB Type A receptacle connector. The pinout of the typical USB 2.0 port is as shown below.

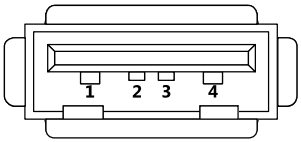


Figure 14: USB 2.0 port pinout diagram

Pin	Signal
1	+5V
2	Data-
3	Data+
4	GND

Table 4: USB 2.0 port pinout

2.1.5. USB 3.0 Port (optional)

The VB8004 mainboard provides two USB 3.0 ports, also known as SuperSpeed USB. The USB 3.0 has a maximum data transfer rate up to 5 Gbps and offers a backwards compatible with previous USB 2.0 specifications. Each USB 3.0 ports are using the USB Type-A receptacle connector. The pinout of the typical USB 3.0 port is as shown below.

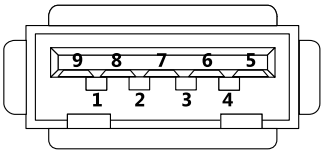


Figure 15: USB 3.0 port pinout diagram

Pin	Signal
1	+5V
2	Data-
3	Data+
4	GND
5	Rx-
6	Rx+
7	GND
8	Tx-
9	Tx+

Table 5: USB 3.0 port pinout

2.1.6. COM Port

The integrated 9-pin COM port uses a male DE-9 connector. The pinout of the COM port is as shown below.

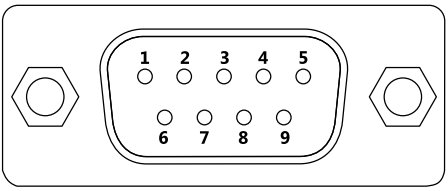


Figure 16: COM port pinout diagram

Pin	Signal	Pin	Signal
1	DCD	6	DSR
2	RxD	7	RTS
3	TxD	8	CTS
4	DTR	9	RI
5	GND		

Table 6: COM port pinout

2.1.7. DVI-I Connector

The integrated DVI-I uses a 24-pin DVI-I female connector. The DVI-I is used to interface with a high-speed, high resolution LCD or CRT displays for digital video output. The pinout of the DVI-I connector is as shown below.

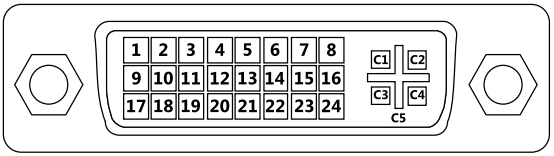


Figure 17: DVI-I connector pinout diagram

Pin	Signal	Pin	Signal	Pin	Signal
1	Tx2-	13	—	C1	CRT_R
2	Tx2+	14	+5V	C2	CRT_G
3	GND	15	GND	C3	CRT_B
4	CRT_SPCLK	16	Hot plug detect	C4	CRT_HSYNC
5	CRT_SPD	17	Tx0-	C5	GND
6	DVI_SPCLK	18	Tx0+		
7	DVI_SPD	19	GND		
8	CRT_VSYNC	20	—		
9	Tx1-	21	—		
10	Tx+	22	GND		
11	GND	23	TxC+		
12	—	24	TxC-		

Table 7: DVI-I connector pinout

Note:

The DVI-to-VGA adapters used for the VB8004 mainboard and VB8004-A daughter board are different. The DVI connector of the VB8004 mainboard has a special specification that requires a special DVI-to-VGA adapter. For more details, check with local sales representatives.

2.1.8. HDMI Port

The integrated 19-pin HDMI port uses an HDMI Type A receptacle connector as defined in the HDMI 1.0 specification. The pinout of the HDMI port is as shown below.

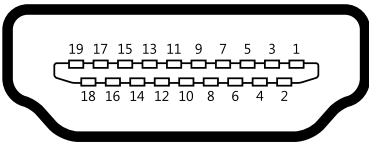


Figure 18: HDMI port pinout diagram

Pin	Signal	Pin	Signal
1	TMDS Data0+	2	GND
3	TMDS Data0–	4	TMDS Data1+
5	GND	6	TMDS Data1–
7	TMDS Data2+	8	GND
9	TMDS Data2–	10	TMDS Data3+
11	GND	12	TMDS Data3-
13	CEC	14	Reserved / HEC Data- [1]
15	SCL [2]	16	SDA [3]
17	DDC/CEC/HEC Ground	18	+5V Power [4]
19	Hot Plug Detect and HEC Data+ [5]		

Table 8: HDMI port pinout

Notes:

1. Pin 14: For HDMI 1.0 – 1.3c this pin is reserved. For HDMI 1.4+ with Ethernet, this pin is optional for one part of the HDMI Ethernet Channel differential signal pair.
2. Pin 15: SCL is for I²C Serial Clock for DDC.
3. Pin 16: SDA is for I²C Serial Data Line for DDC.
4. Pin 18: max 50 mA
5. Pin 19: For all versions of the HDMI specification, this pin is for Hot Plug Detect. For HDMI 1.4+ with Ethernet, this pin is optional for one part of the HDMI Ethernet Channel differential signal pair.

2.2. Onboard Connectors

2.2.1. SATA Power Connector

The mainboard provides two built-in SATA power connectors. These connectors are required to power SATA hard drives. The SATA power connectors are labeled as "S_PWR1" and "S_PWR2". The pinout of the SATA power connectors is shown below.

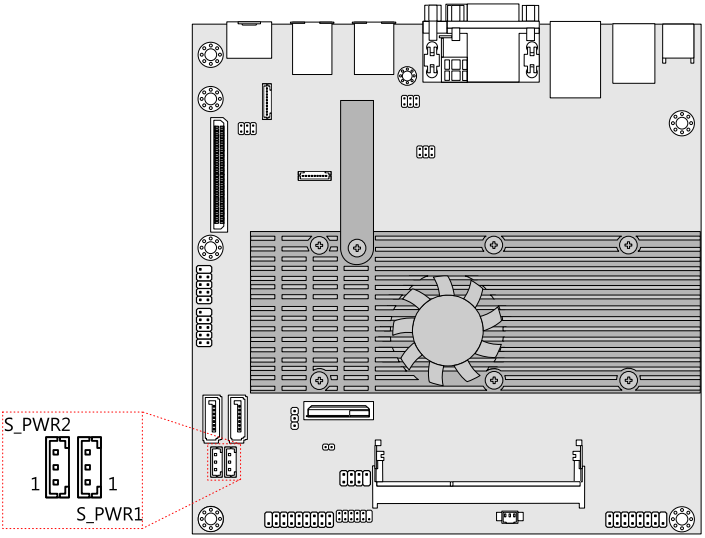


Figure 19: SATA power connector

Pin	Signal
1	+5V
2	+12V
3	GND

Table 9: SATA power connector pinout

2.2.2. CMOS Battery Slot

The VB8004 mainboard is equipped with a CMOS battery slot, which is compatible with CR2032 coin batteries. The CMOS battery slot is labeled as "BAT1".

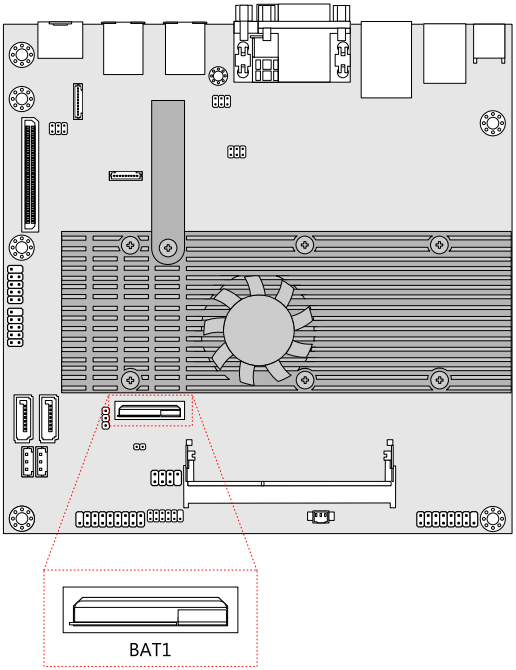


Figure 20: CMOS battery slot

Pin	Signal
1	+3V
2	GND

Table 10: CMOS battery slot pinout

2.2.3. Front Panel Pin Header

The front panel pin header consists of 15 pins in a 16-pin block. Pin 15 is keyed. The front panel pin header is labeled as "F_PANEL1". It provides access to system power LED, HDD LED, power switch and reset switch. The pinout of the front panel pin header is shown below.

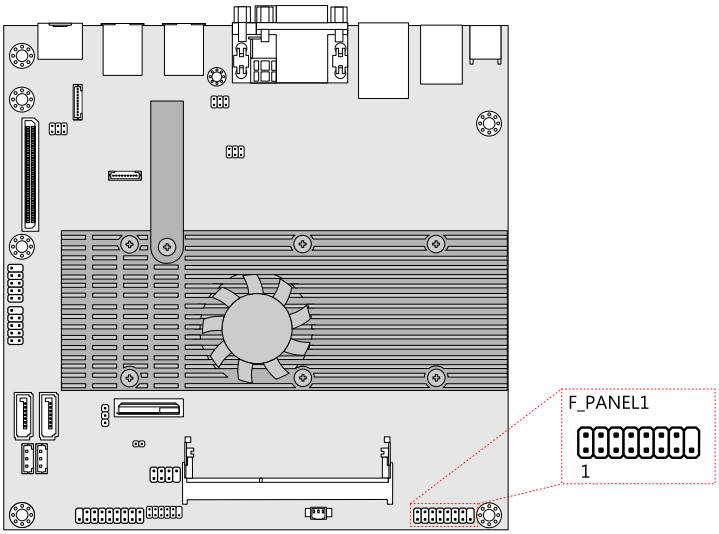


Figure 21: Front panel pin header block

Pin	Signal	Pin	Signal
1	HDD_LED+	2	P_LED+(+5VSUS)
3	HDD_LED-	4	P_LED+(+5VSUS)
5	Power SW	6	-PWR_LED/(SUS_LED)
7	GND	8	LNK_ACT
9	Reset SW	10	+3.3VSUS
11	GND	12	LED1
13	+5VSUS	14	LED2
15	-SLEEP_LED	16	—

Table 11: Front panel pin header pinout

2.2.4. CPU Fan Connector

The onboard CPU fan connector labeled "CN10" is for connecting the CPU fan to maintain CPU cooling. The fan connector is standard 3-prong fan connector. The pinout of the fan connector is as shown below.

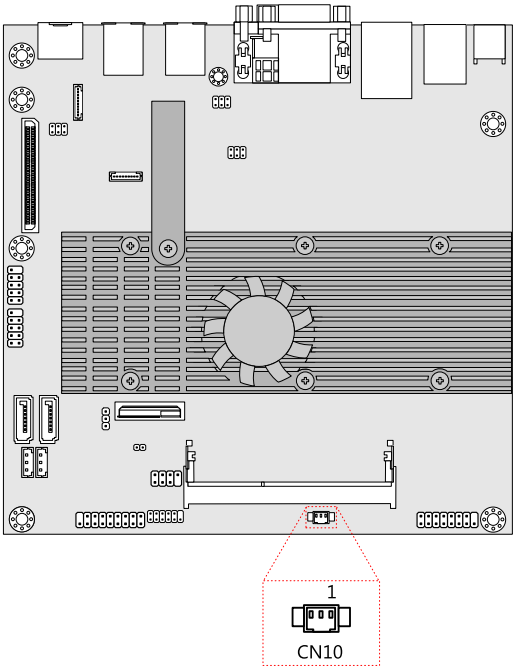


Figure 22: CPU Fan connector

Pin	Signal
1	FANIN
2	FANPWM
3	GND

Table 12: CPU Fan connector pinouts

2.2.5. SATA Connectors

The two SATA connectors on board can support up to 3 Gb/s transfer speeds. The SATA connectors are labeled as "SATA1" and "SATA2". The pinout of the SATA connectors are as shown below.

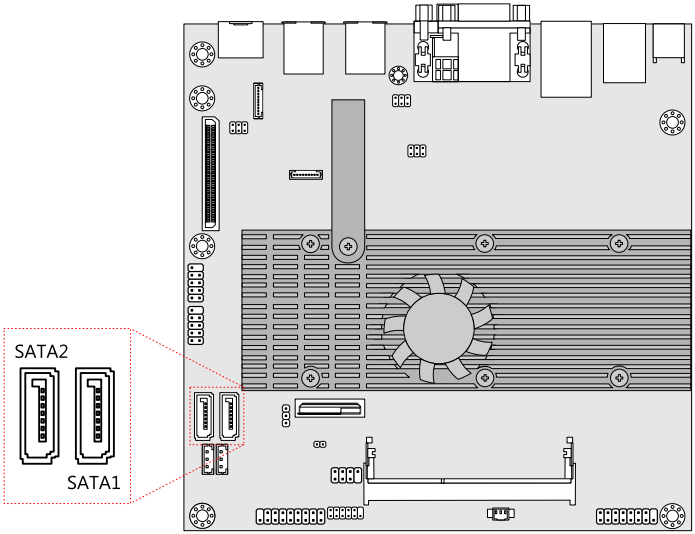


Figure 23: SATA connectors

SATA1	
Pin	Signal
1	Ground
2	STXP_1
3	STXN_1
4	GND
5	SRXN_1
6	SRXP_1
7	GND

SATA2	
Pin	Signal
1	Ground
2	STXP_2
3	STXN_2
4	GND
5	SRXN_2
6	SRXP_2
7	GND

Table 13: SATA connector pinouts

2.2.6. USB 2.0 Pin Header

The VB8004 mainboard has two onboard USB pin headers that enable additional four USB 2.0 ports and allow connecting the WLAN USB module accessory. The pin header blocks are labeled as "USB1" and "USB2". The pinout of the USB pin headers are shown below.

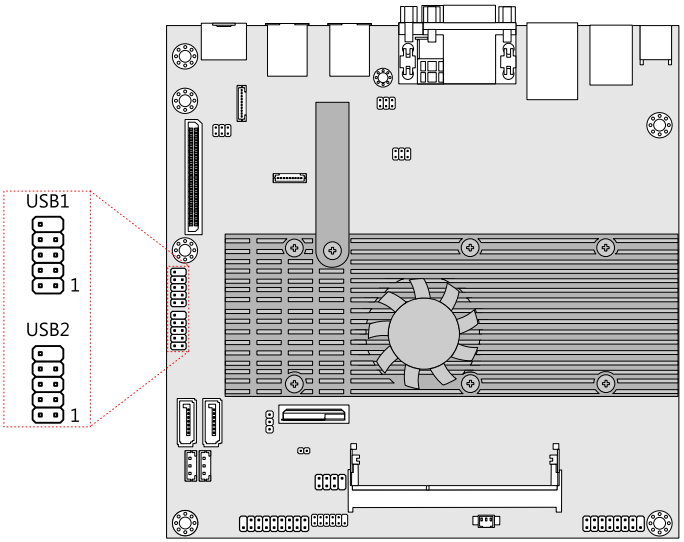


Figure 24: USB 2.0 pin headers block

USB1			
Pin	Signal	Pin	Signal
1	+5VSUS	2	+5VSUS
3	USBH_P1-	4	USBH_P0-
5	USBH_P1+	6	USBH_P0+
7	GND	8	GND
9	—	10	GND

USB2			
Pin	Signal	Pin	Signal
1	+5VSUS	2	+5VSUS
3	USBH_P2-	4	USBH_P7-
5	USBH_P2+	6	USBH_P7+
7	GND	8	GND
9	—	10	GND

Table 14: USB 2.0 pin header pinout

2.2.7. COM Connector

The mainboard includes one onboard COM connector in addition to COM port on the external I/O. The onboard COM connector labeled as "COM1" is used to attach additional COM port that support RS-232 standard. The pinout of 10-pin COM connector is as shown below.

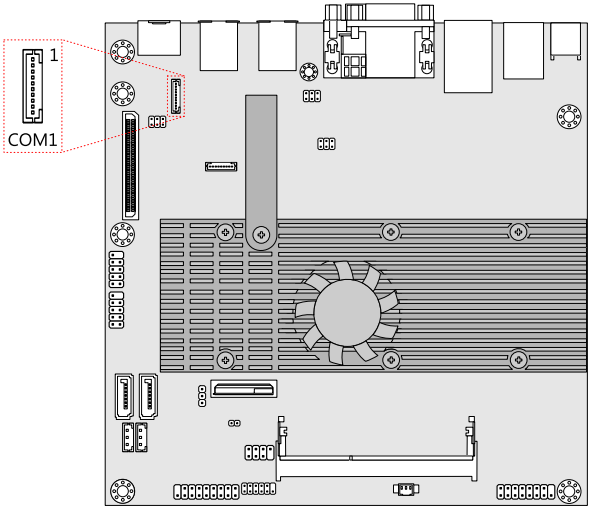


Figure 25: COM connector

Pin	Signal
1	DCD_1
2	RXD_1
3	TXD_1
4	DTR_1
5	GND
6	DSR_1
7	RTS_1
8	CTS_1
9	RI_5_12V1
10	NC

Table 15: COM connector pinout

2.2.8. LPC Connector

The mainboard include one LPC connector for connecting LPC device. It is labeled as "LPC1". The pinout of the 9-pin LPC connector is as shown below.

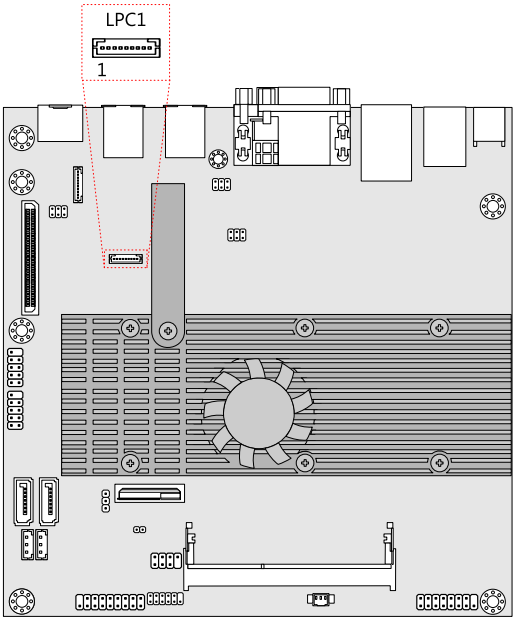


Figure 26: LPC connector

Pin	Signal
1	+3.3V
2	-LPCRST
3	PCICLK2
4	LPCAD0
5	-LPCFRAME
6	LPCAD1
7	LPCAD3
8	LPCAD2
9	GND

Table 16: LPC connector pinout

2.2.9. Audio Pin Header

The VB8004 mainboard has an audio pin header for Line-in, Line-out, MIC-in, S/PDIF-in and 5.1 channel audio output. The pin header is labeled as "AUDIO1". The pinout of the pin header is shown below.

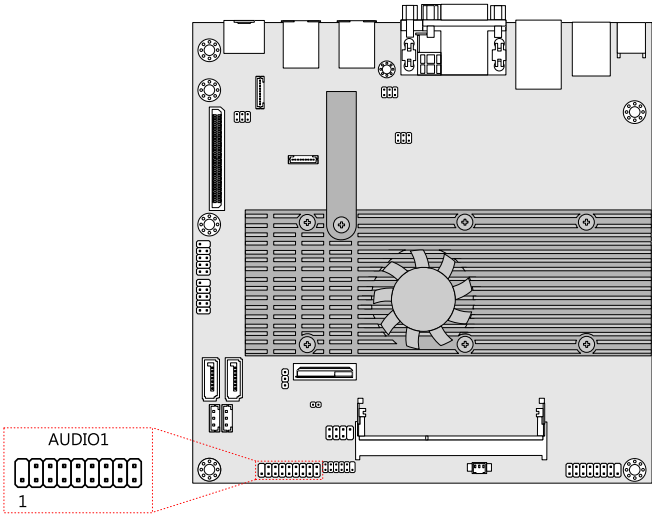


Figure 27: Audio pin header block

Pin	Signal	Pin	Signal
1	AVDD5	2	—
3	LINEOUT_L	4	LINEOUT_R
5	GND_AUD	6	AD_5V
7	MICIN2	8	MICIN
9	LINEL	10	LINER
11	SROUT_L	12	SROUT_R
13	LFE_OUT	14	CEN_OUT
15	SSROUT_L	16	SSROUT_R
17	GND	18	SPDIF_IN1

Table 17: Audio pin header pinout

Note:

For MIC-in: The pin 7 & 8 is stereo sound while pin 6 & 8 is mono sound but only in the left channel.

2.2.10. Digital I/O Pin Header

The onboard Digital I/O pin header supports up to eight GPIO signals. The pin header is labeled as "DIO1". The pinout of the pin header is shown below.

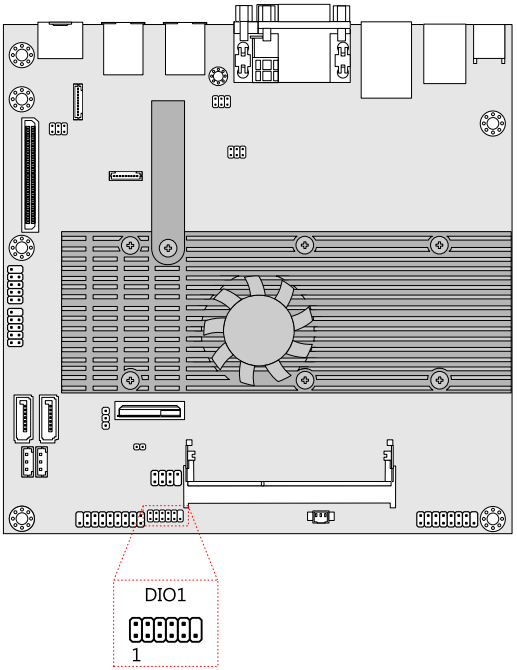


Figure 28: Digital I/O pin header block

Pin	Signal	Pin	Signal
1	5V_DIO	2	12V_DIO
3	GPIO13	4	GPIO12
5	GPIO14	6	GPIO9
7	GPIO15	8	GPI10
9	GPIO16	10	GPI11
11	GND	12	—

Table 18: Digital I/O pin header pinout

2.2.11. Optical Out (SPDIF_Out) Pin Header

The VB8004 mainboard includes Optical Out (S/PDIF Out) pin header. The Optical Out pin header provides digital audio transmission. The S/PDIF audio cable connects to the Optical Out (S/PDIF Out) pin header on the mainboard, and connects the other end to the Optical / S/PDIF module.

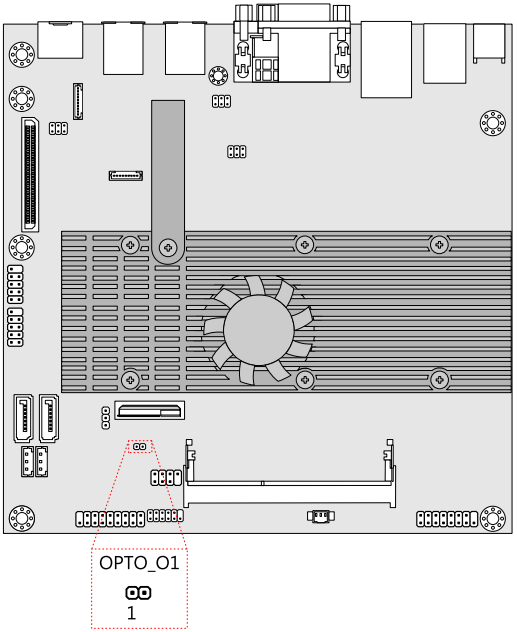


Figure 29: Optical Out pin header

Pin	Signal
1	SPDIF_OUT
2	GND

Table 19: Optical Out pin header pinout

2.2.12. SPI Pin Header

The VB8004 mainboard has one onboard 8-pin SPI pin header. The pin header is labeled as "SPI1". The pinout of the pin header is shown below.

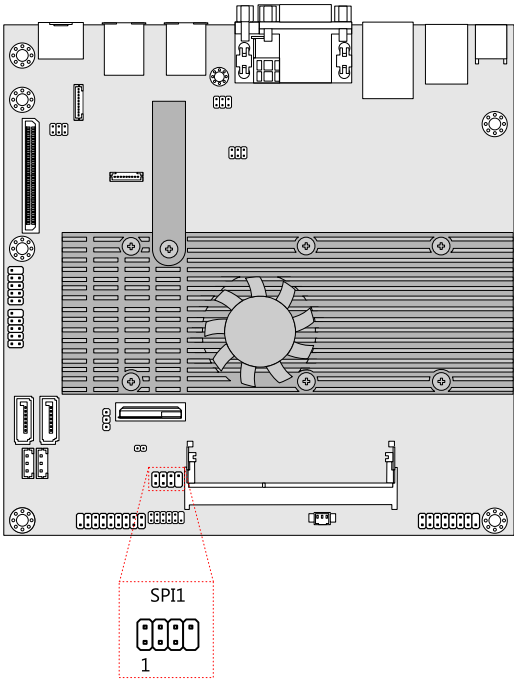


Figure 30: SPI pin header block

Pin	Signal	Pin	Signal
1	SPIVCC	2	GND
3	MSPISS0	4	MSPICLK
5	MSPIDI	6	MSPIDO
7	—	8	RST_SW

Table 20: SPI pin header pinout

2.2.13. LVDS panel connector

The onboard LVDS panel connector supports single-channel 24-bit displays. It is labeled as LVDS1 and located at the bottom side of the mainboard. The pinout of the LVDS panel connector is as shown below.

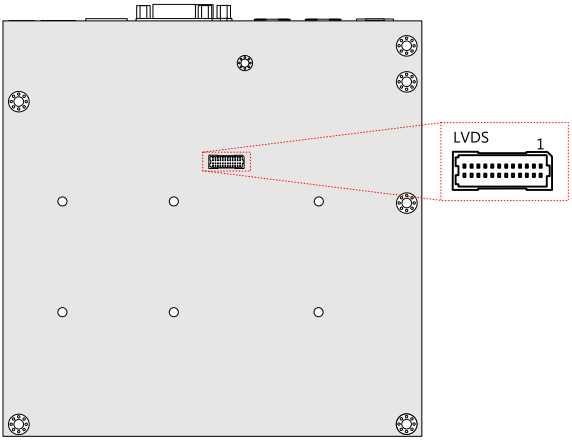


Figure 31: LVDS panel connector

Pin	Signal	Pin	Signal
1	LVDSD0-	2	LVDSD1-
3	LVDSD0+	4	LVDSD+
5	GND	6	GND
7	PVDD2	8	LVDSD2-
9	PVDD2	10	LVDSD2+
11	LCD1_DATA	12	GND
13	LCD1_CLK	14	LVDSCLK+
15	GND	16	LVDSCLK-
17	VDD_BL	18	GND
19	VDD_BL	20	LVDSD3-
21	BLEN_1	22	LVDSD3+
23	DIMMING	24	GND

Table 21: LVDS panel connector pinouts

Note:

LVDS panel connector (LVDS1):
- Vendor: ACES
- Part number: 87216-2416-06

3. Jumpers and Switches

3.1. Clear CMOS Jumper

The onboard CMOS RAM stores system configuration data and has an onboard battery power supply. To reset the CMOS settings, set the jumper on pins 2 and 3 while the system is off. Return the jumper to pins 1 and 2 afterwards. Setting the jumper while the system is on will damage the mainboard. The default setting is on pins 1 and 2.

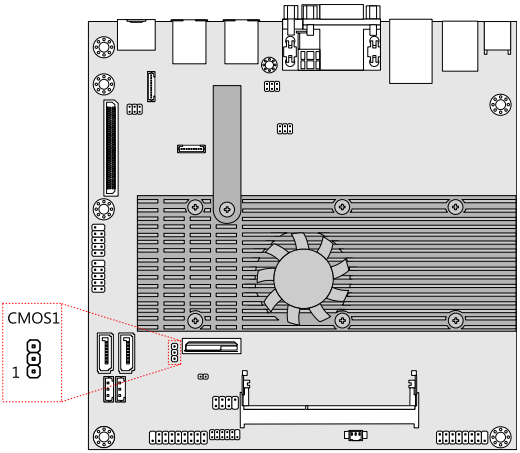


Figure 32: Clear CMOS jumper

Setting	Pin 1	Pin 2	Pin 3
Regular (default)	On	On	Off
Clear CMOS	Off	On	On

Table 22: Clear CMOS jumper settings

Note:

Except when clearing the RTC RAM, never remove the cap from the CLEAR_CMOS jumper default position. Removing the cap will cause system boot failure. Avoid clearing the CMOS while the system is on; it will damage the mainboard.

3.2. COM Voltage Select Jumpers

The voltage select jumpers are set to determine the input voltage of COM connectors. Each COM connector (available through the onboard COM pin headers) can support both +5V and +12V.

3.2.1. J1: Voltage Select Jumper

The voltage for external COM port ("labeled "CN2A") at the back panel is controlled by the jumper labeled as "J1".

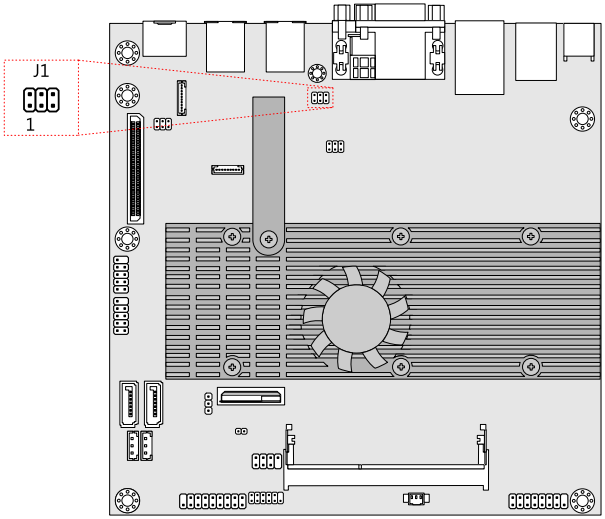
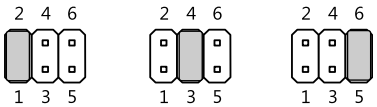


Figure 33: Voltage select jumper (J1) for COM port



Setting	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
RI (default)	On	On	Off	Off	Off	Off
+5V	Off	Off	On	On	Off	Off
+12V	Off	Off	Off	Off	On	On

Table 23: Voltage select jumper settings (J1)

3.2.2. J2 Voltage Select Jumper

The voltage for onboard COM connector (labeled "COM1") is controlled by the jumper labeled as "J2".

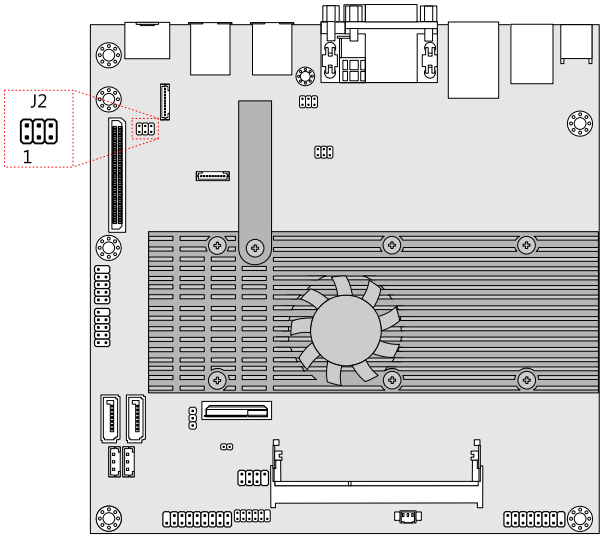
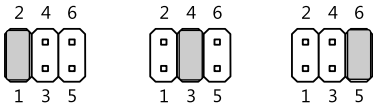


Figure 34: Voltage select jumper (J2) for COM connector



Setting	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
RI (default)	On	On	Off	Off	Off	Off
+5V	Off	Off	On	On	Off	Off
+12V	Off	Off	Off	Off	On	On

Table 24: Voltage select jumper settings (J2)

3.3. Panel and Backlight Power Select Jumper

The power selectors for panel and backlight are controlled by the jumper labeled as "J3". It can be either +3.3V or +5V for panel power and +12V or +5V for backlight power. The J3 jumper settings are shown below.

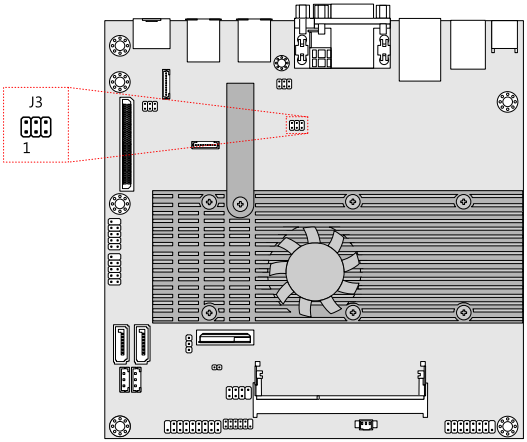
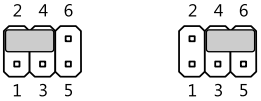
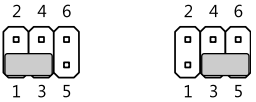


Figure 35: Panel and backlight power select jumper (J3)



Setting	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
+3.3V (default)	Off	On	Off	On	Off	Off
+5V	Off	Off	Off	On	Off	On

Table 25: Panel power select jumper settings



Setting	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
+12V	On	Off	On	Off	Off	Off
+5V (default)	Off	Off	On	Off	On	Off

Table 26: Backlight power select jumper settings

4. Expansion Slots

4.1. DDR3 SODIMM Memory Slot

The DDR3 SODIMM memory slot can accommodate up to 4 GB of 1066 MHz memory. The location of the DDR3 SODIMM memory slot is as shown below.

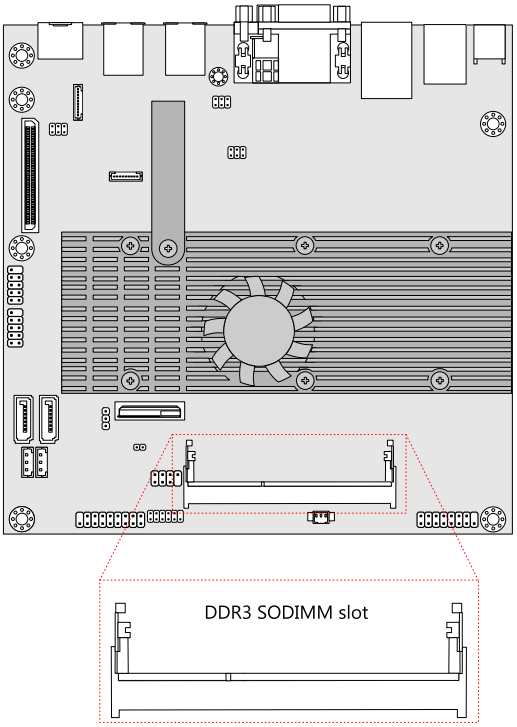


Figure 36: DDR3 SODIMM memory slot

4.1.1. Installing a SODIMM Memory Module

Step 1

Align the notch on the bottom of the DDR3 memory module with the notch wedge in the slot.

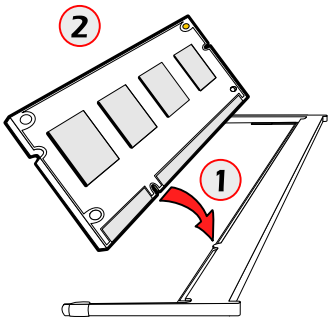


Figure 37: Installing memory 1

Step 2

Then insert the memory module into the SODIMM socket at a 30 degree angle.

Step 3

Then push down until the memory module snaps into place. The SODIMM slot has two locking mechanisms that will click once the memory module has been fully inserted.

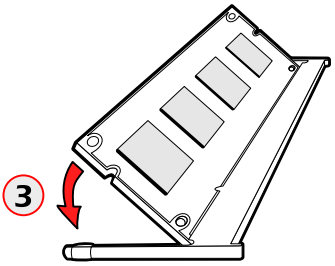


Figure 38: Installing memory 2

4.2. Proprietary 80-pin connector

The Proprietary 80-pin connector labeled as "CN9" is an onboard expansion connector for connecting VB8004-A daughter board to the VB8004 mainboard. The location and pinout of the 80-pin connector are as shown below.

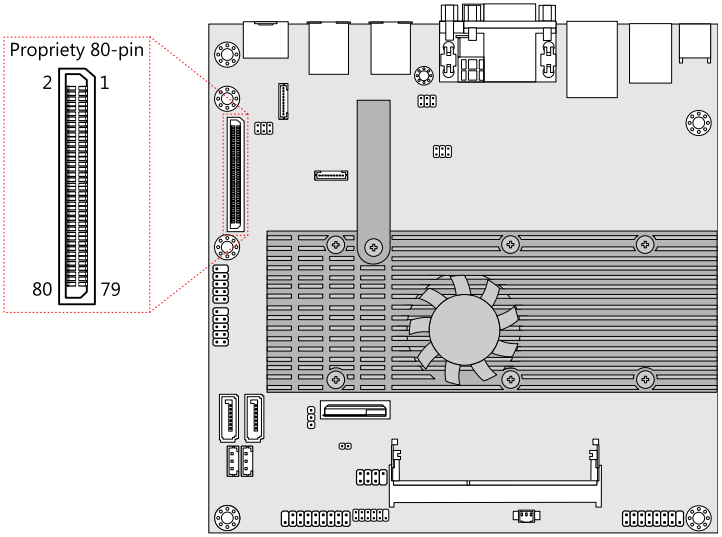


Figure 39: Proprietary 80-pin connector

Note:

Proprietary 80-pin connector (CN9):
- Vendor: SAMTEC
- Part number: ERM8-040-09.0-L-DV-K-TR

Pin	Signal		Pin	Signal
1	USBHP5-		2	VMAIN
3	USBHP5+		4	VMAIN
5	GND		6	VMAIN
7	CR_D3		8	-PEX4RST
9	CR_CMD		10	GND
11	GND		12	PEXRX9-
13	CR_D2		14	PEXRX9+
15	-CR_CD		16	GND
17	GND		18	PETN9
19	CR_D1		20	PETP9
21	CR_WPD		22	GND
23	GND		24	PE4CLK-
25	CR_D0		26	PE4CLK+
27	CR_CLK		28	GND
29	GND		30	PEXRX4-
31	DP2TN3		32	PEXRX4+
33	DP2TP3		34	GND
35	GND		36	PEXRX5-
37	DP2TP2		38	PEXRX5+
39	DP2TN2		40	GND
41	GND		42	PEXRX6-
43	DP2TP1		44	PEXRX6+
45	DP2TN1		46	GND
47	GND		48	PEXRX7-
49	DP2TP0		50	PEXRX7+
51	DP2TN0		52	GND
53	GND		54	PETP4
55	DP2_AUX-		56	PETN4
57	DP2_AUX+		58	GND
59	-DP2_HPD		60	PETP5
61	-PEREQ1		62	PETN5
63	VCCCRPWR		64	GND
65	NC		66	PETP6
67	GND		68	PETN6
69	-USBHOC5		70	GND

71	-SUSB		72	PETP7
73	-PEX1RST		74	PETN7
75	-PEXWAKE		76	GND
77	SMB_DAT		78	PE1CLK+
79	SMB_CLK		80	PE1CLK-

Table 27: Proprietary 80-pin connector pinout

5. Hardware Installation

5.1. Installing into a Chassis

The mounting holes of VB8004 mainboard are compatible with the standard Mini-ITX holes. The mainboard can be fitted into any chassis that has the mounting holes compatible with the standard Mini-ITX mounting holes locations. However, the length of I/O coastline on the VB8004 mainboard is non-standard in length. Therefore, the user must have a customized I/O bracket.

The chassis to be used must meet the minimum height requirements of the VB8004 mainboard and accommodate the additional height space requirements if the VB8004-A daughter board is being used.

5.1.1. Suggested minimum chassis dimensions

The figure below shows the suggested minimum space requirements that a chassis should have in order to work well with the VB8004 mainboard.

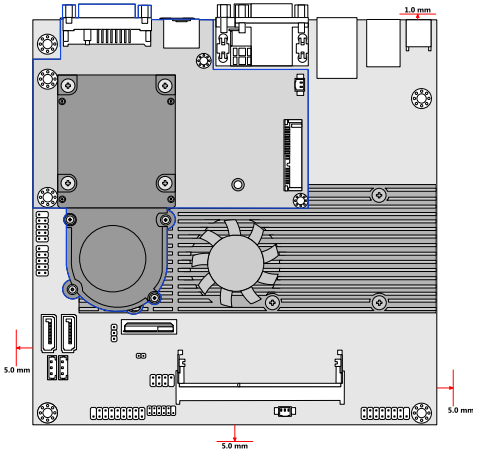


Figure 40: Suggested minimum chassis dimensions

Each side of the VB8004 mainboard should have a buffer zone from the internal wall of the chassis. The side of the VB8004 mainboard that accommodates the I/O coastline should have a buffer of 1.00 mm. The side on the opposite end of the I/O coastline and the two adjacent sides should have a buffer of at least 5.00 mm each.

5.1.2. Suggested minimum chassis height

The figure below shows the suggested minimum height requirements for the internal space of the chassis. It is not necessary for the internal ceiling to be evenly flat. What is required is that the internal ceiling height must be strictly observed for each section that is highlighted. The highest part of the ceiling will be above the VB8004-A daughter board heatsink.

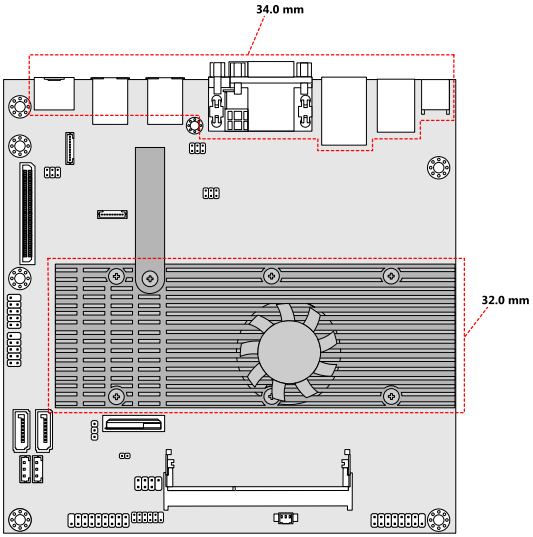


Figure 41: Suggested minimum internal chassis height for VB8004-16X SKU

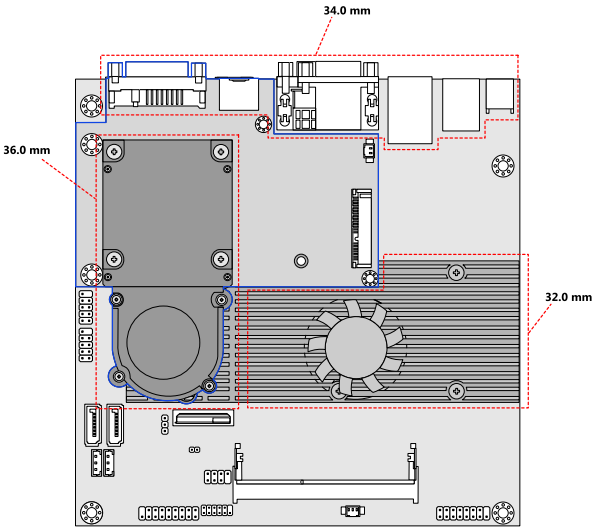


Figure 42: Suggested minimum internal chassis height for VB8004-6XS SKU

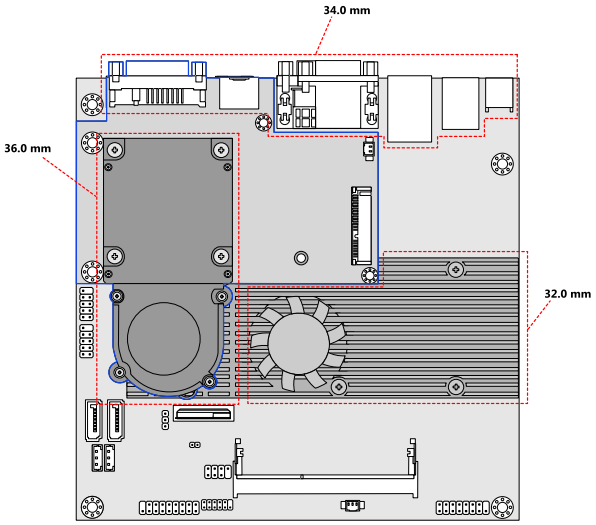


Figure 43: Suggested minimum internal chassis height for VB8004-16S SKU

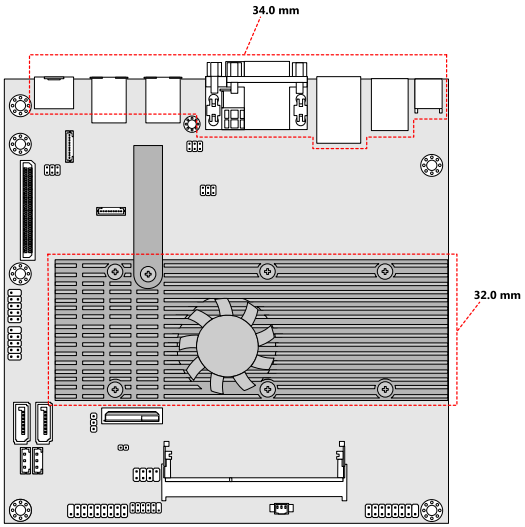


Figure 44: Suggested minimum internal chassis height for VB8004-16 SKU

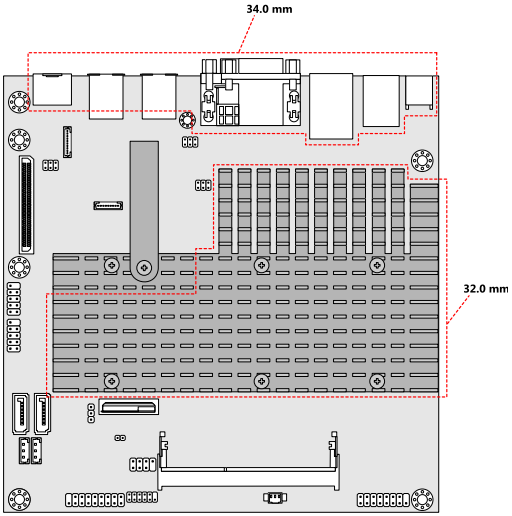


Figure 45: Suggested minimum internal chassis height for VB8004-12E SKU

Note:

In getting the minimum height requirement for internal space of the chassis, it is required to consider the height of the LVDS connector located at the bottom side of the VB8004 mainboard.

5.1.3. Suggested keep out areas

The figures below show the areas of the mainboard that is highly suggested to leave unobstructed.

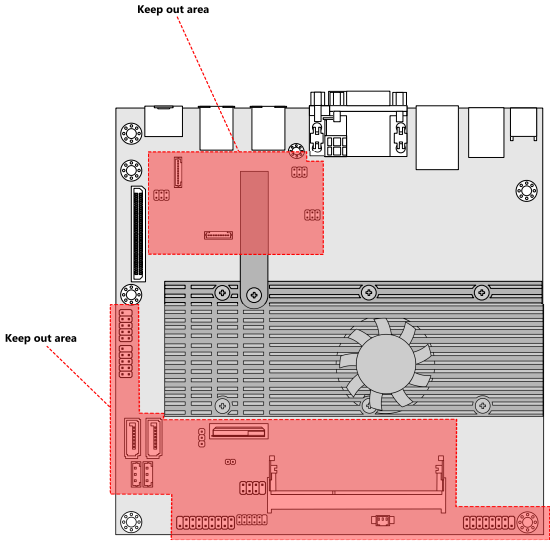


Figure 46: Suggested keep out areas for VB8004-16X SKU

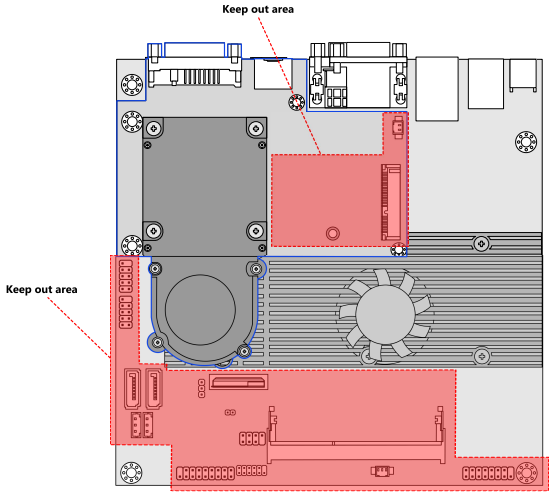


Figure 47: Suggested keep out areas for VB8004-16XS SKU

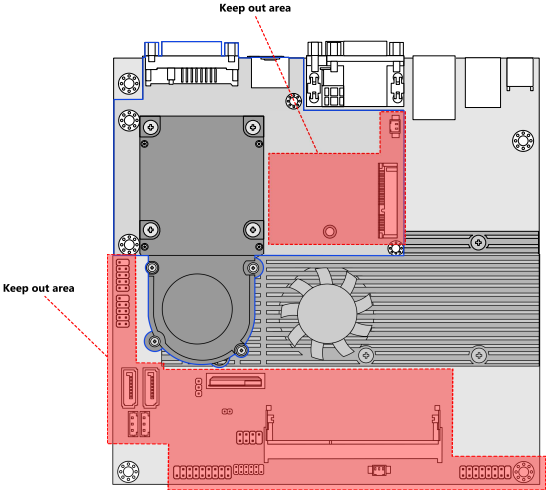


Figure 48: Suggested keep out areas for VB8004-16S SKU

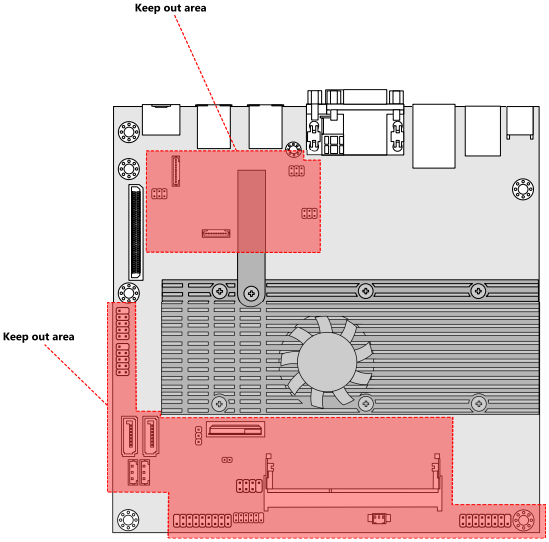


Figure 49: Suggested keep out areas for VB8004-16 SKU

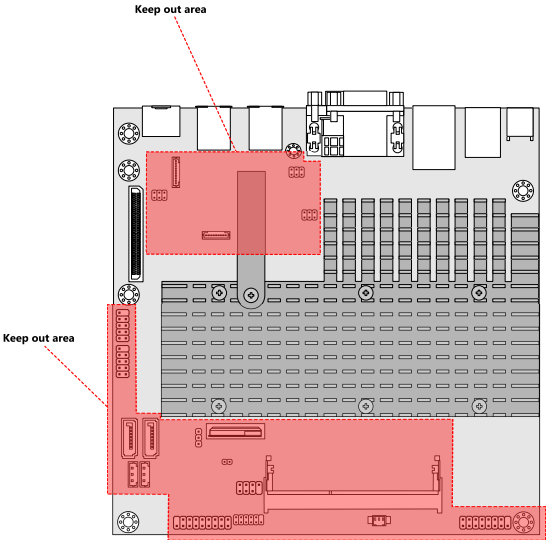


Figure 50: Suggested keep out areas for VB8004-12E SKU

6. BIOS Setup Utility

6.1. Entering the BIOS Setup Utility

Power on the computer and press **Delete** during the beginning of the boot sequence to enter the BIOS Setup Utility. If the entry point has passed, restart the system and try again.

6.2. Control Keys

Up Move up one row

Down Move down one row

Left Move to the left in the navigation bar

Right Move to the right in the navigation bar

Enter Access the highlighted item

Esc Jumps to the Exit screen or returns to the previous screen

+[1] Increase the numeric value

-[1] Decrease the numeric value

F1 General help[2]

F7 Discard changes

F9 Load optimized defaults

F10 Save all the changes and exit

Notes:

1. Must be pressed using the 10-key pad.
2. The General help contents are only for the Status Page and Option Page setup menus.

6.3. Getting Help

The BIOS Setup Utility provides a "General Help" screen. This screen can be accessed at any time by pressing **F1**. The help screen displays the keys for using and navigating the BIOS Setup Utility. Press **Esc** to exit the help screen.

6.4. System Overview

The System Overview screen is the default screen that is shown when the BIOS Setup Utility is launched. This screen can be accessed by traversing the navigation bar to the "Main" label.

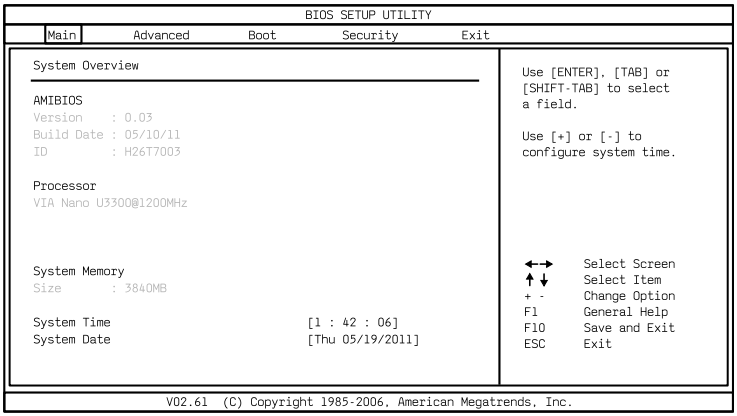


Figure 51: Illustration of the Main menu screen

6.4.1. AMIBIOS

The content in this section of the screen shows the current BIOS version, build date, and ID number.

6.4.2. Processor

This content in this section shows the CPU information that has been detected. This information includes the CPU name and speed.

6.4.3. System Memory

This section shows the amount of available memory that has been detected.

6.4.4. System Time

This section shows the current system time. Press **Tab** to traverse right and **Shift+Tab** to traverse left through the hour, minute, and second segments. The **+** and **-** keys on the number pad can be used to change the values. The time format is [Hour : Minute : Second].

6.4.5. System Date

This section shows the current system date. Press **Tab** to traverse right and **Shift+Tab** to traverse left through the month, day, and year segments. The **+** and **-** keys on the number pad can be used to change the values. The weekday name is automatically updated when the date is altered. The date format is [Weekday, Month, Day, Year].

6.5. Advanced Settings

The Advanced Settings screen shows a list of categories that can provide access to a sub-screen. Sub-screen links can be identified by the preceding right-facing arrowhead.

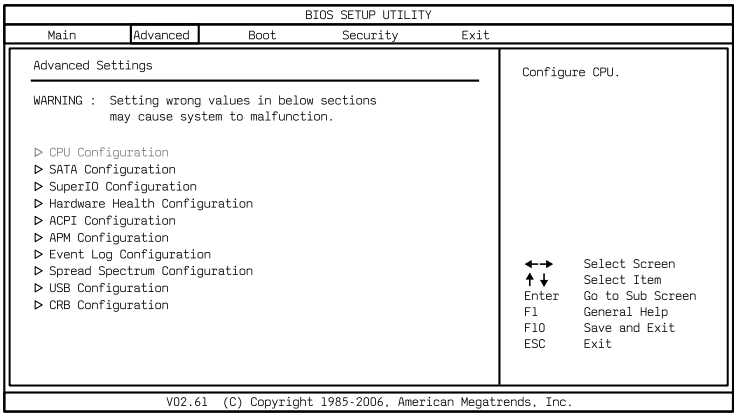


Figure 52: Illustration of the Advanced Settings screen

The Advanced Settings screen contains the following links:

- CPU Configuration
- SATA Configuration
- SuperIO Configuration
- Hardware Health Configuration
- ACPI Configuration
- APM Configuration
- Event Log Configuration
- Spread Spectrum Configuration
- USB Configuration
- CRB Configuration

6.5.1. CPU Configuration

The CPU Configuration screen shows detailed information about the built-in processor. In addition to the processor information, the thermal controls can be set.

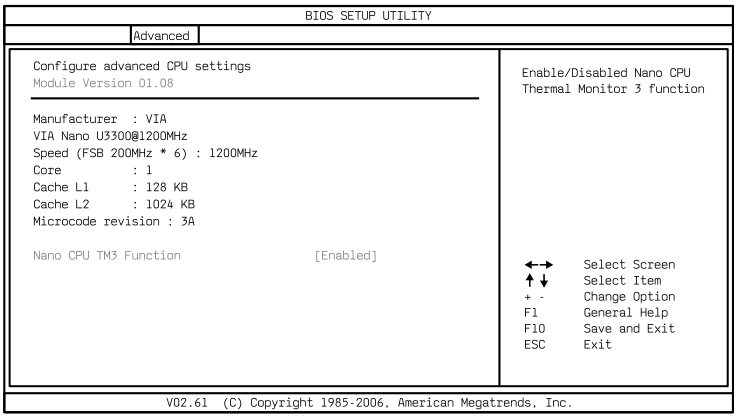


Figure 53: Illustration of the CPU Configuration screen

6.5.1.1. Nano CPU TM3 Function

The Nano CPU TM3 Function has two settings: Disabled and Enabled. When the setting is changed to "Disabled", the CPU's built-in thermal sensor will not function. When the setting is changed to "Enabled", the thermal sensor will automatically adjust the CPU ratio and V_{CORE} to prevent the CPU from overheating.

6.5.2. SATA Configuration

The SATA Configuration screen shows links to the primary master and slave SATA hard drive information screens.

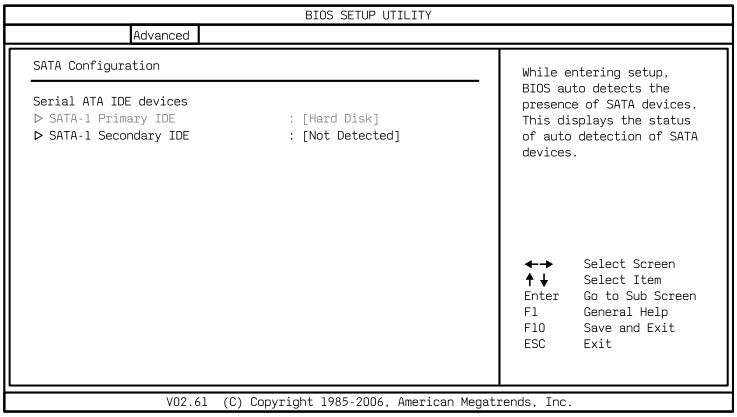

BIOS SETUP UTILITY
Advanced
SATA Configuration
Serial ATA IDE devices
▷ SATA-1 Primary IDE : [Hard Disk]
▷ SATA-1 Secondary IDE : [Not Detected]
While entering setup, BIOS auto detects the presence of SATA devices. This displays the status of auto detection of SATA devices.
Select Screen
Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
V02.61 (C) Copyright 1985-2006, American Megatrends, Inc.

Figure 54: Illustration of SATA Configuration screen

6.5.2.1. SATA-1 Primary IDE

When a hard drive is detected, the hard drive's detailed information can be displayed on the SATA-1 Primary IDE sub-screen.

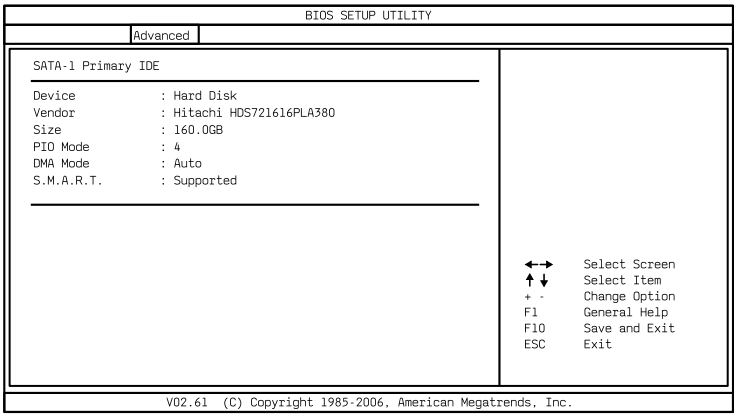


Figure 55: Illustration of SATA-1 Primary IDE screen

6.5.2.2. SATA-1 Secondary IDE

When a secondary hard drive is detected, the hard drive's detailed information can be displayed on the SATA-1 Secondary IDE sub-screen.

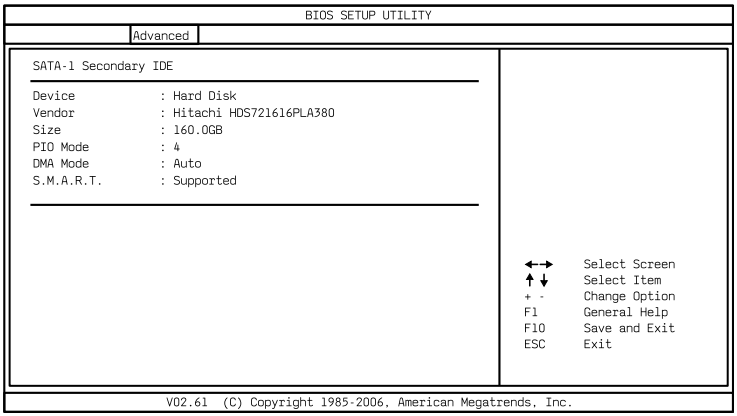


Figure 56: Illustration of SATA-1 Secondary IDE screen

6.5.3. SuperIO Configuration

The SuperIO Configuration screen shows the specific addresses and IRQs of the onboard serial ports.

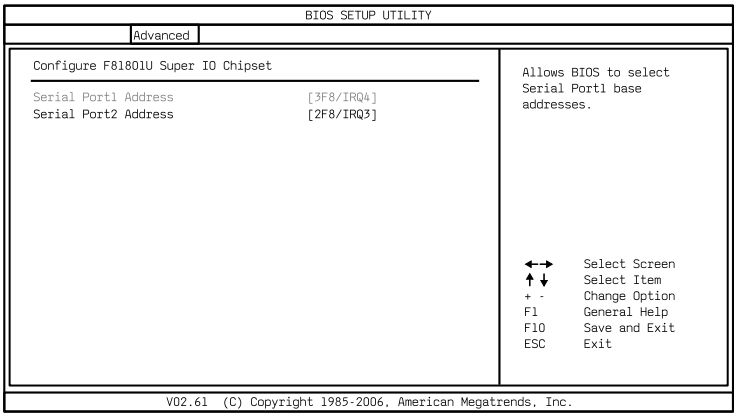


Figure 57: Illustration of SuperIO Configuration screen

6.5.3.1. Serial Ports 1 to 2 Address

The Serial Port 1 to 2 has three selectable options.

Port	Address and IRQs
1	3F8/IRQ4, 3E8/IRQ4, 2E8/IRQ3
2	2F8/IRQ3, 3E8/IRQ4, 2E8/IRQ3

Table 28: Serial port addresses and IRQs

6.5.4. Hardware Health Configuration

The Hardware Health Configuration screen has no editable fields. The system temperature is taken from an optional sensor that is connected to the J5 pin header.

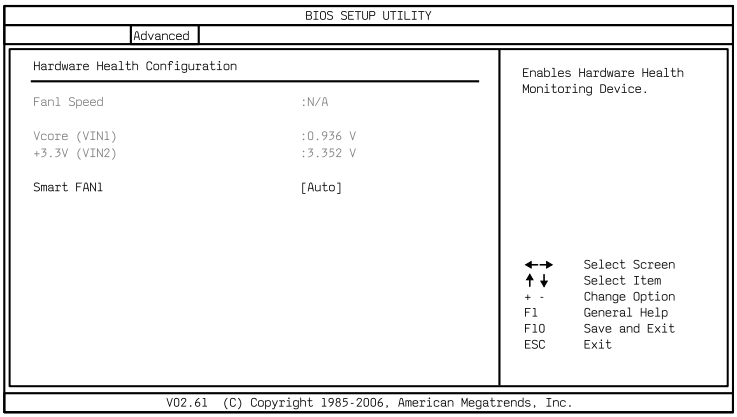


Figure 58: Illustration of Hardware Health Configuration screen

6.5.4.1. Smart FAN1

The Smart FAN1 has two selectable mode options.

Auto

When set to Auto, the speed of the CPU fan is varied according to CPU temperature.

Full Speed

When set to Full Speed, the CPU fan speed is fixed and running at highest speed.

6.5.5. ACPI Configuration

ACPI grants the operating system direct control over system power management. The ACPI Configuration screen can be used to set a number of power management related functions.

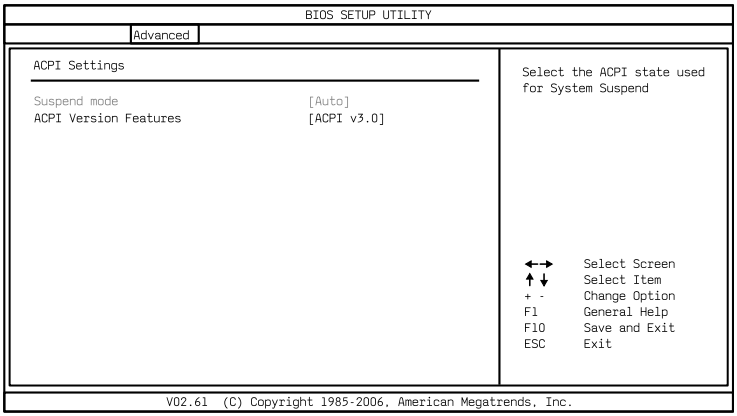


Figure 59: Illustration of ACPI Configuration screen

6.5.5.1. Suspend Mode

The Suspend Mode field has three selectable options.

S1 (POS)

S1/Power On Suspend (POS) is a low power state. In this state, no system context (CPU or chipset) is lost and hardware maintains all system contexts.

S3 (STR)

S3/Suspend To RAM (STR) is a power-down state. In this state, power is supplied only to essential components such as main memory and wakeup-capable devices. The system context is saved to main memory, and context is restored from the memory when a "wakeup" event occurs.

Auto

When the Suspend Mode is set to Auto, the operating system will control the power state.

6.5.5.2. ACPI Version Features

The ACPI Version has three selectable version options.

ACPI v1.0

Supports ACPI v1.0

ACPI v2.0

Supports ACPI v2.0

ACPI v3.0

Supports ACPI v3.0

6.5.6. APM Configuration

APM enables the operating system to co-work with the BIOS to control the system power management. The APM Configuration screen can be used to set a number of power management functions.

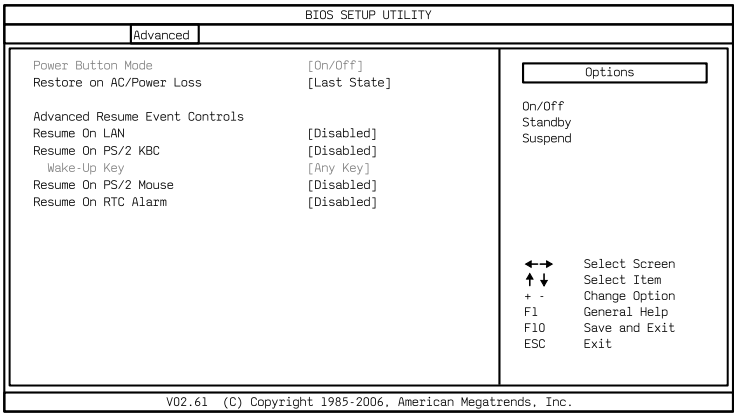


Figure 60: Illustration of APM Configuration screen

6.5.6.1. Power Button Mode

The Power Button Mode has three options.

On/Off

When On/Off is selected, pressing the power button will instantly cause the system to power on or off.

Standby

When Standby is selected, the power button must be pressed and held down for 4 seconds before the system will power off.

Suspend

When Suspend is selected, pressing the power button will instantly cause the system to enter suspend mode.

6.5.6.2. Restore on AC/Power Loss

Restore on AC/Power Loss defines how the system will respond after AC power has been interrupted while the system is on. There are three options.

Power Off

The Power Off option keeps the system in an off state until the power button is pressed again.

Power On

The Power On option restarts the system when the power has returned.

Last State

The Last State option restores the system to its previous state when the power was interrupted.

6.5.6.3. Resume on LAN

Resume on LAN allows to turned on a system that has been put into suspend or standby mode. When this feature is enabled, LAN activity as defined in the **Resume on LAN** feature will cause the system to wake up. This feature has three options.

S1

The S1 option enables LAN activity to be detected if the system is in S1 power saving mode.

S1/S3/S4/S5

The S1/S3/S4/S5 option enables LAN activity to be detected if the system is in S1/S3/S4/S5 power saving mode.

Disabled

The Disabled option disables the detection of all LAN activity.

6.5.6.4. Resume on PS/2 KBC

Resume on PS/2 KBC wakes up a system that has been put into suspend or standby mode. When this feature is enabled, keyboard activity as defined in the **Wake-Up Key** feature will cause the system to wake up. This feature has three options.

S3

The S3 option enables PS/2 keyboard activity to be detected if the system is in S3 power saving mode.

S3/S4/S5

The S3/S4/S5 option enables PS/2 keyboard activity to be detected if the system is in S3/S4/S5 power saving mode.

Disabled

The Disabled option disables the detection of all PS/2 keyboard activity.

6.5.6.5. Wake-Up Key

The Wake-Up Key feature can only be set when **Resume on PS/2 KBC** is set to "S3" or "S3/S4/S5". Otherwise, this feature will be not selectable. This feature has two options.

Any Key

The Any Key option enables any key on the keyboard to trigger the Wake-Up event.

Specific Key

The Specific Key option unlocks the **Wake-Up Password** feature.

6.5.6.6. Wake-Up Password

The Wake-Up Password feature can only be set when the **Wake-Up Key** feature is set to "Specific Key". This feature enables the user to specify a key sequence that must be entered in order to wake up the system.

The key sequence can consist of up to 6 alphanumeric characters and some special characters. Function keys and modifier keys (such as Ctrl, Alt, Del, etc.) cannot be used.

6.5.6.7. Resume on PS/2 Mouse

Resume on PS/2 Mouse wakes up a system that has been put into suspend or standby mode. When this feature is enabled, any PS/2 mouse activity that is detected will cause the system to wake up. This feature has three options.

> **Note:**
>
> This feature support Erp/Eup provision.

S3

The S3 option enables any PS/2 mouse activity to be detected if the system is in S3 power saving mode.

S3/S4/S5

The S3/S4/S5 option enables any PS/2 mouse activity to be detected if the system is in S3/S4/S5 power saving mode.

Disabled

The Disabled option disables the detection of all PS/2 mouse activity.

6.5.6.8. Resume on RTC Alarm

Resume on RTC Alarm can only be used if **Resume on Software RTC Alarm** is not enabled. This feature enables the BIOS to automatically power on the system at a scheduled time. When enabled, the **RTC Alarm Date** and **System Time** features will be unlocked.

6.5.6.9. RTC Alarm Date (Days)

The RTC Alarm Date feature is visible only when **Resume on RTC Alarm** is enabled. This feature enables the user to specify a specific date each month or daily recurrence. Use the + and - keys on the number pad to change the value of the RTC Alarm Date.

Every Day

The Every Day option triggers the RTC Alarm daily.

1 – 31

When a specific numeric date is selected, the RTC Alarm will be triggered on that day of the month.

6.5.6.10. System Time

The System Time option enables the user to specify the time the system should power on for the date that is set in **RTC Alarm Date**.

6.5.7. Event Log Configuration

The Event Log Configuration screen shows the option settings to manage the entire event log.

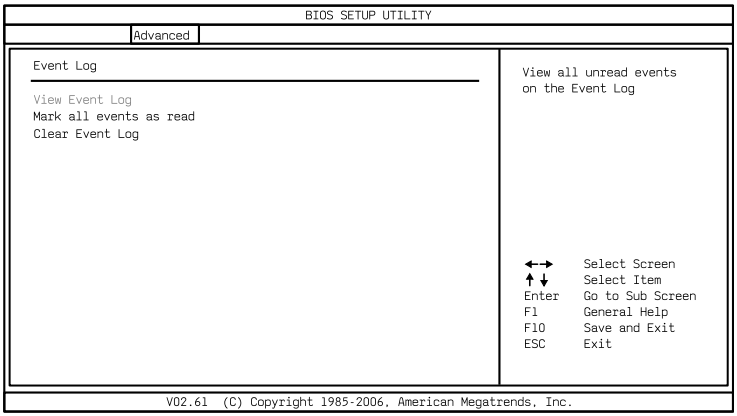


Figure 61: Illustration of Event Log Configuration screen

6.5.7.1. View Event Log

The View Event Log is to view all unread events on the Event Log.

6.5.7.2. Mark all events as read

Mark all the unread events as read on the Event log.

6.5.7.3. Clear Event Log

The Clear Event Log is to discard all events in the Event Log.

6.5.8. Spread Spectrum Configuration

The Spread Spectrum Configuration screen enables access to the Spread Spectrum Setting feature.

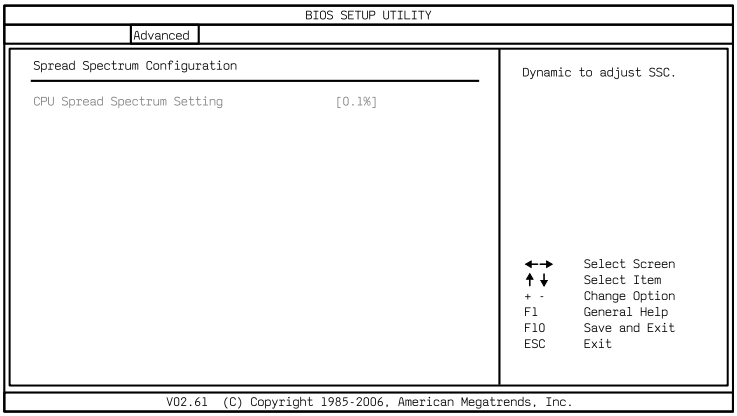


Figure 62: Illustration of Spread Spectrum Configuration screen

6.5.8.1. CPU Spread Spectrum Setting

The Spread Spectrum Setting feature enables the BIOS to modulate the clock frequencies originating from the mainboard. The settings are in percentages of modulation. Higher percentages result in greater modulation of clock frequencies. This feature has settings that range from 0.1% to 0.9%.

6.5.9. USB Configuration

The USB Configuration screen shows the number of connected USB devices.

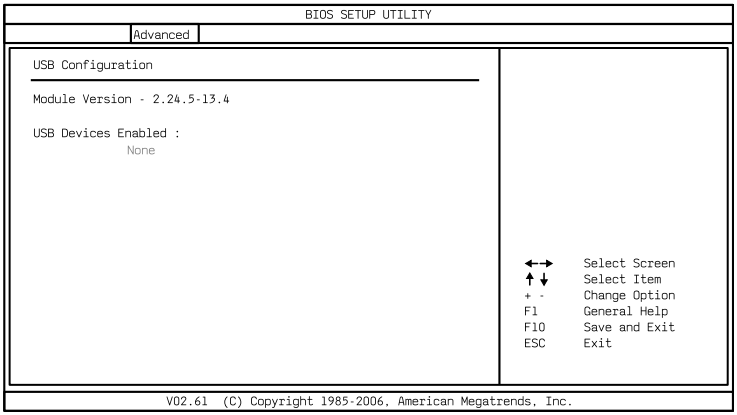


Figure 63: Illustration of USB Configuration screen

6.5.10. CRB Configuration

The CRB Configuration screen shows the available BIOS-controlled DRAM clock, graphics adapter, display device and LAN control features.

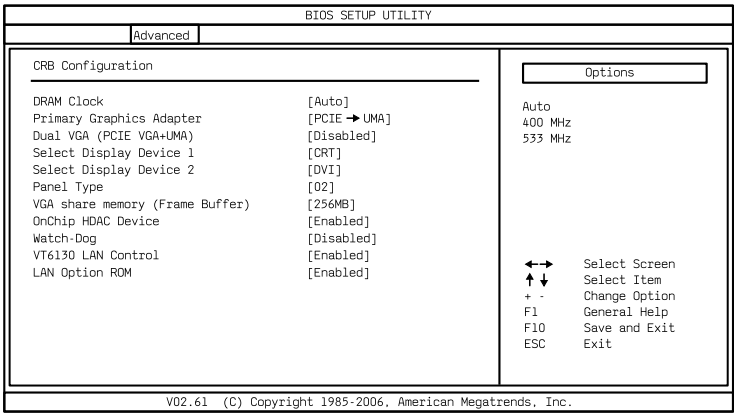


Figure 64: Illustration of CRB Configuration screen

6.5.10.1. DRAM Clock

The DRAM Clock feature is for controlling the system DRAM. All other DRAM features are automated and cannot be accessed.

Auto

The Auto option enables the BIOS to select a compatible clock frequency for the installed memory.

400 MHz

The 400 MHz option forces the BIOS to be fixed at 800 MHz for DDR3 memory modules.

533 MHz

The 533 MHz option forces the BIOS to be fixed at 1066 MHz for DDR3 memory modules.

6.5.10.2. Primary Graphics Adapter

The Primary Graphics Adapter option enables the user to change the order in which the BIOS seeks for a graphics adapter. There are two paths that can be chosen: UMA -->PCIE and PCIE →UMA

6.5.10.3. Dual VGA (PCIE VGA+UMA)

This feature enables the dual VGA function. This feature has two options: enabled and disabled.

> **Note:**
>
> The dual VGA function is supported only when using Windows 7 and this feature should enable in MAMM (Multi-Adapter Multiple-Monitor) mode.

6.5.10.4. Select Display Device 1 and 2

The Select Display Device feature enables the user to choose a specific display interface. This feature has four options: CRT, LCD, DVI, and HDMI.

CRT

Specifies the CRT port as the display port being used by using the DVI to VGA adapter.

LCD

Specifies the LCD port as the display port being used.

DVI

Specifies the DVI port as the display port being used.

HDMI

Specifies the HDMI port as the display port being used.

6.5.10.5. Panel Type

This feature enables the user to specify the resolution of the display being used with the system. The panel types are predefined in the BIOS.

Settings	Description
00	640 x 480
01	800 x 600
02	1024 x 768
03	1280 x 768
04	1280 x 1024
05	1400 x 1050
06	1440 x 900
07	1280 x 800
08	800 x 400
09	1024 x 600
10	1366 x 768
11	1600 x 1200
12	1680 x 1050
13	User define
14	User define
15	User define

Table 29: Panel types resolution

Note:

If the user want to sets or adjusts the display backlight brightness, please check with the local sales representative for customized BIOS support.

6.5.10.6. VGA Share Memory (Frame Buffer)

The VGA Share Memory feature enables the user to choose the amount of the system memory to reserve for use by the integrated graphics controller. The amount of memory that can be reserved ranges from 64 – 512 MB.

6.5.10.7. OnChip HDAC Device

The OnChip HDAC Device feature enables the BIOS to control the high definition audio codec in the chipset. This feature has two options: enable and disable.

6.5.10.8. Watch-Dog

The Watch-Dog feature monitors the system to ensure that the system has not frozen. If the system appears to have frozen for a specific period of time, then the Watch-Dog function will force the system to reboot. This feature has two options: enable and disabled.

6.5.10.9. VT6130 LAN Control

The VT6130 LAN Control feature determines whether the onboard LAN controller will be used or not.

6.5.10.10. LAN Option ROM

The LAN Option ROM feature will only be visible if the **VT6130 LAN Control** feature is enabled. If the LAN Option ROM feature is enabled, then the system will load a separate ROM for the LAN controller in order to boot from Gigabit LAN.

6.6. Boot Settings

The Boot Settings screen has a single link that goes to the **Boot Settings Configuration** and **Boot Device Priority** screens.

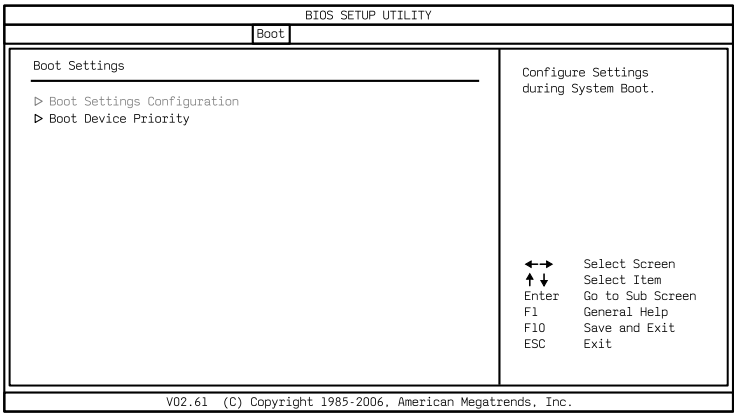


Figure 65: Illustration of Boot Settings screen

6.6.1. Boot Settings Configuration

The Boot Settings Configuration screen has several features that can be run during the system boot sequence.

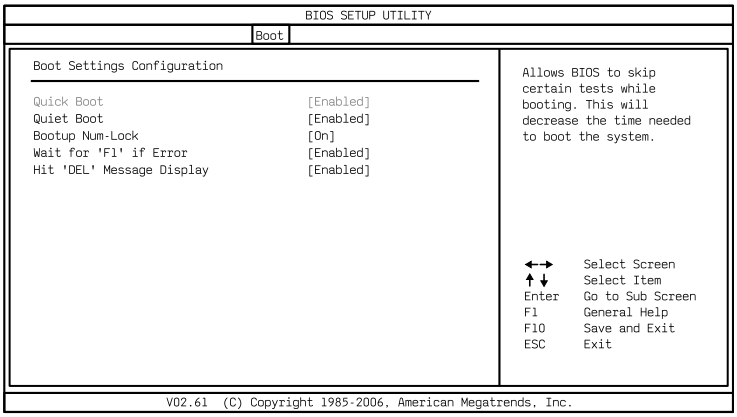

BIOS SETUP UTILITY
Boot
Boot Settings Configuration
Quick Boot [Enabled]
Quiet Boot [Enabled]
Bootup Num-Lock [On]
Wait for 'F1' if Error [Enabled]
Hit 'DEL' Message Display [Enabled]
Allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.
←→ Select Screen
↑↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
V02.61 (C) Copyright 1985-2006, American Megatrends, Inc.

Figure 66: Illustration of Boot Settings Configuration

6.6.1.1. Quick Boot

The Quick Boot feature enables the BIOS to skip certain tests in order to speed up the boot sequence. This feature has two options: enabled and disabled.

6.6.1.2. Quiet Boot

The Quiet Boot feature hides all of the Power-on Self Test (POST) messages during the boot sequence. Instead of the POST messages, the user will see an OEM logo. This feature has two options: enabled and disabled.

6.6.1.3. Bootup Num-Lock

The Bootup Num-Lock feature determines how the 10-key pad will behave. When the feature is enabled, the 10-key pad will behave as a number pad. When the feature is disabled, the 10-key pad will behave as cursor navigation keys.

6.6.1.4. Wait for 'F1' if Error

This feature determines how the system will respond if an error is detected during the boot sequence. If this feature is enabled, the BIOS will pause booting and wait for the user to press F1 to enter the BIOS setup menu. This feature has two options: enabled and disabled.

6.6.1.5. Hit 'DEL' Message Display

This feature determines if the BIOS will display a POST message that informs the user how to access the BIOS Setup Utility.[1] This feature has two options: enabled and disabled.

Note:

1. If the Quiet Boot option is enabled, the settings of this feature will have no effect.

6.6.2. Boot Device Priority

The Boot Device Priority feature automatically detects and list all bootable storage devices. The boot seek sequence can be changed in this menu.

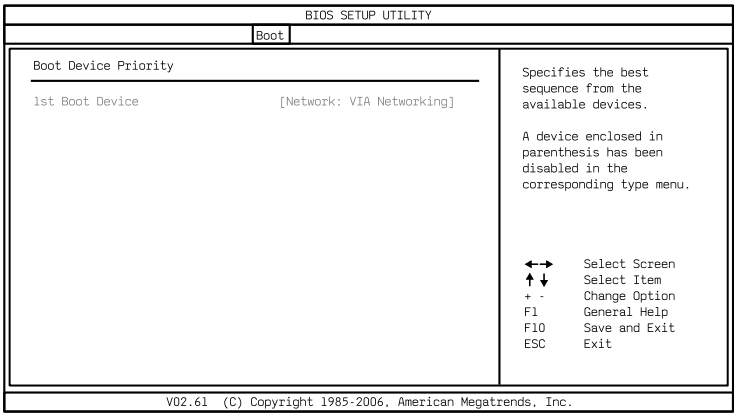


Figure 67: Illustration of Boot Device Priority

6.6.2.1. 1st Boot Device

To specifies the boost sequence from the available devices. The available boot devices are detected dynamically according to real situation and variable options will be provided. This feature has two options: Network: VIA Networking Bootagent, and Disabled]

6.7. Security Settings

The Security Settings screen provides a way to restrict access to the BIOS or even the entire system.

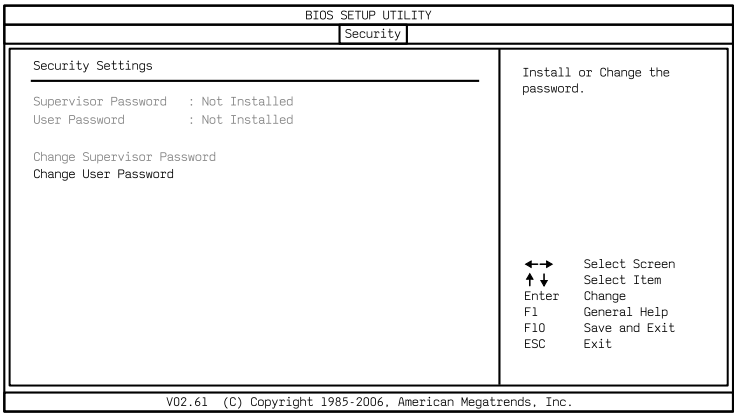


Figure 68: Illustration of Security Settings screen

6.7.1. Change Supervisor Password

This option is for setting a password for accessing the BIOS setup utility. When a password has been set, a password prompt will be displayed whenever the BIOS setup utility is launched. This prevents an unauthorized person from changing any part of the system configuration.

When a supervisor password is set, the **Password Check** option will be unlocked.

6.7.2. Change User Password

This option is for setting a password for non-supervisors. When a user password is set, the Clear User Password and Password Check options will be unlocked.

6.7.3. Clear User Password

This option is only available when the user accesses the BIOS Setup Utility when the user password has been specified.

6.7.4. Password Check

This feature is compulsory when the **Change Supervisor Password** option is set. The user will have up to three chances to enter the correct password before the BIOS forces the system to stop booting. If the user does not enter the correct password, the keyboard will also lock up. The only way to get past this is to do a hard reboot (i.e., use the system reset button or cut off the power to the system). A soft reboot (i.e., Ctrl+Alt+Del) will not work because the keyboard will be locked. This feature has two options.

Setup

The Setup option forces user to enter a password in order to access the BIOS Setup Utility.

Always

The Always option forces users to enter a password in order to boot up the system.

6.8. Exit Options

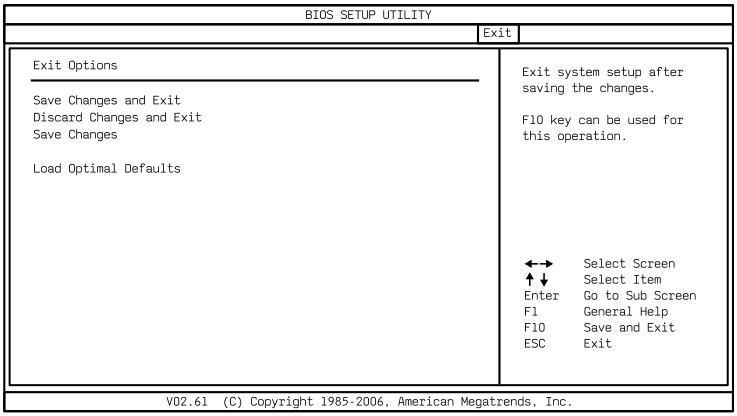


Figure 69: Illustration of Exit Options screen

6.8.1. Save Changes and Exit

Save all changes to the BIOS and exit the BIOS Setup Utility. The "F10" hotkey can also be used to trigger this command.

6.8.2. Discard Changes and Exit

Exit the BIOS Setup Utility without saving any changes. The "Esc" hotkey can also be used to trigger this command.

6.8.3. Discard Changes

This command reverts all changes to the settings that were in place when the BIOS Setup Utility was launched. The "F7" hotkey can also be used to trigger this command.

6.8.4. Load Optimal Defaults

Load optimal default values for all the setup items. The default optimized values are defined by the mainboard manufacturer to provide optimized

environment for a basic system. The "F9" hotkey can also be used to trigger this command.

7. Driver Installation

7.1. Microsoft Driver Support

The VIA VB8004 mainboard is compatible with Microsoft operating systems. The latest Windows drivers can be downloaded from the VEPD website at www.viaembedded.com.

For embedded operating systems, the related drivers can be found in the VIA Embedded website at www.viaembedded.com.

7.2. Linux Driver Support

The VIA VB8004 mainboard is highly compatible with many Linux distributions.

Support and drivers are provided through various methods including:

- Drivers provided by VIA
- Using a driver built into a distribution package
- Visiting www.viaembedded.com for the latest updated drivers
- Installing a third party driver (such as the ALSA driver from the Advanced Linux Sound Architecture project for integrated audio)

For OEM clients and system integrators developing a product for long term production, other code and resources may also be made available. You can submit a request to your VEPD support contact.

Appendix A. Video Combination

A.1. Video Combination

Device Board	VB8004 Mainboard (output from VX900)				VB8004-A Daughter board (output from S3 5400E)		
	DACs	Internal	DP1	DVP1	DAC1	COMBO 01	COMBO 02
Output	CRT#0 (from adapter)	LVDS	HDMI	DVI#0	CRT (from adapter)	DVI	HDMI
Configuration 1 (default)			B	*A*		D	*C*
Configuration 2		B		*A*		C	D
Configuration 3			*A*	B		D	*C*
Configuration 4		B	*A*			*C*	D
Configuration 5	B		*A*		D		*C*
Configuration 6	B	*A*			D		*C*

Table 30: Display Combination

B = SAMM of *A* = Extend mode

D = SAMM of *C* = Extend mode

Notes:

1. SAMM (Single-adapter Multiple Monitor)
2. MAMM (Multi-adapter Multiple Monitor)
3. MAMM mode (allows up to 4 displays) supported only on Windows 7 OS.
4. All video combinations in the table are validated by VIA. For other combinations that are not included in the table, please check with the local sales representative for project support.

Appendix B.
Power Consumption Report

Power consumption tests were performed on the VIA VB8004. The following tables represent the breakdown of the voltage, amp and wattage values while running common system applications.

B.1. VB8004-12E

The tests were performed based on the following specification and additional components:

- **CPU:** VIA Nano 1.2 GHz
  - (U3300_1.2 GHz_Fanless)
- **Chipset:** VX900
- **Memory:** Apacer 4GB DDR3
- **HDD:** WD 2.5" 250GB SATA
- **Power:** AC adapter DC-In 12V/5A
- **OS:** Win XP + SP3

B.1.1. Burn-in 3DMark06, 1280 x 1024 (Bench mode)

Test Condition	Volts	Amperes	Watts
Maximum	11.65	1.924	22.415
Average	11.65	1.505	17.533
Minimum	11.65	1.052	12.256

B.1.2. Stress Tool (CPU usage = 100%)

This benchmark was performed using PowerDVD 8.0 using the HDMI interface.

Test Condition	Volts	Amperes	Watts
Maximum	11.53	1.836	21.169
Average	11.53	1.718	19.809
Minimum	11.53	1.252	14.436

B.1.3. Power DVD 8.0 to Player H.264 1080i_10M Movie

Test Condition	Volts	Amperes	Watts
Maximum	11.70	1.584	18.533
Average	11.70	1.148	13.432
Minimum	11.70	1.024	11.981

B.1.4. Power DVD 8.0 to Player MPEG2 1080P_40M Movie

Test Condition	Volts	Amperes	Watts
Maximum	11.63	1.636	19.027
Average	11.63	1.340	15.584
Minimum	11.63	1.032	12.002

B.1.5. Idle at Windows XP

Test Condition	Volts	Amperes	Watts
Maximum	11.81	1.256	14.833
Average	11.81	0.998	11.786
Minimum	11.81	0.960	11.338

B.1.6. Suspend S1

Test Condition	Volts	Amperes	Watts
Maximum	11.86	0.764	9.061
Average	11.86	0.713	8.456
Minimum	11.86	0.708	8.397

B.1.7. Suspend S3

Test Condition	Volts	Amperes	Watts
Maximum	11.99	0.056	0.671
Average	11.99	0.048	0.576
Minimum	11.99	0.044	0.528

B.1.8. Suspend S4

Test Condition	Volts	Amperes	Watts
Maximum	11.99	0.032	0.384
Average	11.99	0.028	0.336
Minimum	11.99	0.024	0.288

B.1.9. Suspend S5

Test Condition	Volts	Amperes	Watts
Maximum	11.99	0.032	0.384
Average	11.99	0.028	0.336
Minimum	11.99	0.024	0.288

B.2. VB8004-16

The tests were performed based on the following specification and additional components:

- **CPU:** VIA Nano 1.3+ GHz
  - (U3100_1.3+ GHz_Fan 5000rpm)
- **Chipset:** VX900
- **Memory:** Apacer 4GB DDR3
- **HDD:** WD 2.5" 250GB SATA
- **Power:** AC adapter DC-In 12V/5A
- **OS:** Win XP + SP3

B.2.1. Burn-in 3DMark06, 1280 x 1024 (Bench mode)

Test Condition	Volts	Amperes	Watts
Maximum	11.13	2.528	28.137
Average	11.13	2.105	23.429
Minimum	11.13	1.112	12.377

B.2.2. Stress Tool (CPU usage = 100%)

This benchmark was performed using PowerDVD 8.0 using the HDMI interface.

Test Condition	Volts	Amperes	Watts
Maximum	11.35	2.536	28.784
Average	11.35	2.366	26.854
Minimum	11.35	1.880	21.338

B.2.3. Power DVD 8.0 to Player H.264 1080i_10M Movie

Test Condition	Volts	Amperes	Watts
Maximum	11.56	2.208	25.524
Average	11.56	1.263	14.600
Minimum	11.56	1.128	13.040

B.2.4. Power DVD 8.0 to Player MPEG2 1080P_40M Movie

Test Condition	Volts	Amperes	Watts
Maximum	11.53	2.236	25.781
Average	11.53	1.533	17.675
Minimum	11.53	1.144	13.190

B.2.5. Idle at Windows XP

Test Condition	Volts	Amperes	Watts
Maximum	11.67	1.436	16.758
Average	11.67	1.124	13.117
Minimum	11.67	1.088	12.697

B.2.6. Suspend S1

Test Condition	Volts	Amperes	Watts
Maximum	11.58	0.840	9.727
Average	11.58	0.821	9.507
Minimum	11.58	0.808	9.357

B.2.7. Suspend S3

Test Condition	Volts	Amperes	Watts
Maximum	11.98	0.056	0.671
Average	11.98	0.051	0.611
Minimum	11.98	0.044	0.527

B.2.8. Suspend S4

Test Condition	Volts	Amperes	Watts
Maximum	11.99	0.036	0.432
Average	11.99	0.031	0.372
Minimum	11.99	0.028	0.336

B.2.9. Suspend S5

Test Condition	Volts	Amperes	Watts
Maximum	11.99	0.036	0.432
Average	11.99	0.032	0.384
Minimum	11.99	0.028	0.336

B.3. VB8004-16X

The tests were performed based on the following specification and additional components:

- **CPU:** VIA Nano 1.6 GHz
  - (U3100_1.6 GHz_Fan 5000rpm)
- **Chipset:** VX900
- **Memory:** Apacer 4GB DDR3
- **HDD:** WD 2.5" 250GB SATA
- **Power:** AC adapter DC-In 12V/5A
- **OS:** Win XP + SP3

B.3.1. Burn-in 3DMark06, 1280 x 1024 (Bench mode)

Test Condition	Volts	Amperes	Watts
Maximum	11.64	3.36	39.110
Average	11.64	2.68	31.195
Minimum	11.64	1.24	14.434

B.3.2. Stress Tool (CPU usage = 100%)

This benchmark was performed using PowerDVD 8.0 using the HDMI interface.

Test Condition	Volts	Amperes	Watts
Maximum	11.48	3.52	40.410
Average	11.48	2.92	33.522
Minimum	11.48	2.24	25.715

B.3.3. Power DVD 8.0 to Player H.264 1080i_10M Movie

Test Condition	Volts	Amperes	Watts
Maximum	11.64	2.56	29.798
Average	11.64	1.45	16.878
Minimum	11.64	1.12	13.037

B.3.4. Power DVD 8.0 to Player MPEG2 1080P_40M Movie

Test Condition	Volts	Amperes	Watts
Maximum	11.56	2.52	29.131
Average	11.56	1.76	20.346
Minimum	11.56	1.16	13.410

B.3.5. Idle at Windows XP

Test Condition	Volts	Amperes	Watts
Maximum	11.70	2.04	23.868
Average	11.70	1.18	13.806
Minimum	11.70	1.08	12.636

B.3.6. Suspend S1

Test Condition	Volts	Amperes	Watts
Maximum	11.81	0.80	9.448
Average	11.81	0.77	9.094
Minimum	11.81	0.76	8.976

B.3.7. Suspend S3

Test Condition	Volts	Amperes	Watts
Maximum	11.99	0.076	0.911
Average	11.99	0.073	0.875
Minimum	11.99	0.072	0.863

B.3.8. Suspend S4

Test Condition	Volts	Amperes	Watts
Maximum	12.00	0.032	0.384
Average	12.00	0.028	0.336
Minimum	12.00	0.020	0.240

B.3.9. Suspend S5

Test Condition	Volts	Amperes	Watts
Maximum	11.99	0.064	0.767
Average	11.99	0.061	0.731
Minimum	11.99	0.056	0.671

B.4. VB8004-16S

The tests were performed based on the following specification and additional components:

- **CPU:** VIA Nano 1.6 GHz
  - (U3100_1.6 GHz_Fan 5000rpm)
- **Chipset:** VX900 and S3 5400E
- **Memory:** Apacer 4GB DDR3
- **HDD:** WD 2.5" 250GB SATA
- **Power:** AC adapter DC-In 12V/5A
- **OS:** Win XP + SP3

B.4.1. Burn-in 3DMark06, 1280 x 1024 (Bench mode)

Test Condition	Volts	Amperes	Watts
Maximum	11.45	3.80	43.510
Average	11.45	3.08	35.266
Minimum	11.45	1.84	21.068

B.4.2. Stress Tool (CPU usage = 100%)

This benchmark was performed using PowerDVD 8.0 using the HDMI interface.

Test Condition	Volts	Amperes	Watts
Maximum	11.32	3.32	37.582
Average	11.32	3.05	34.526
Minimum	11.32	2.72	30.790

B.4.3. Power DVD 8.0 to Player H.264 1080i_10M Movie

Test Condition	Volts	Amperes	Watts
Maximum	11.35	3.20	36.320
Average	11.35	2.82	32.007
Minimum	11.35	1.88	21.338

B.4.4. Power DVD 8.0 to Player MPEG2 1080P_40M Movie

Test Condition	Volts	Amperes	Watts
Maximum	11.42	3.16	36.087
Average	11.42	2.63	30.035
Minimum	11.42	1.88	21.470

B.4.5. Idle at Windows XP

Test Condition	Volts	Amperes	Watts
Maximum	11.60	2.36	27.376
Average	11.60	1.90	22.040
Minimum	11.60	1.80	20.880

B.4.6. Suspend S1

Test Condition	Volts	Amperes	Watts
Maximum	11.68	1.58	18.454
Average	11.68	1.56	18.221
Minimum	11.68	1.548	18.081

B.4.7. Suspend S3

Test Condition	Volts	Amperes	Watts
Maximum	12.00	0.048	0.576
Average	12.00	0.044	0.528
Minimum	12.00	0.040	0.480

B.4.8. Suspend S4

Test Condition	Volts	Amperes	Watts
Maximum	12.00	0.036	0.432
Average	12.00	0.031	0.372
Minimum	12.00	0.028	0.336

B.4.9. Suspend S5

Test Condition	Volts	Amperes	Watts
Maximum	12.00	0.036	0.432
Average	12.00	0.030	0.360
Minimum	12.00	0.028	0.336

B.5. VB8004-16XS

The tests were performed based on the following specification and additional components:

- **CPU:** VIA Nano 1.6 GHz
  - (U3100_1.6 GHz_Fan 5000rpm)
- **Chipset:** VX900 and S3 5400E
- **Memory:** Apacer 4GB DDR3
- **HDD:** WD 2.5" 250GB SATA
- **Power:** AC adapter DC-In 12V/5A
- **OS:** Win XP + SP3

B.5.1. Burn-in 3DMark06, 1280 x 1024 (Bench mode)

Test Condition	Volts	Amperes	Watts
Maximum	11.44	4.44	50.794
Average	11.44	3.78	43.243
Minimum	11.44	2.12	24.253

B.5.2. Stress Tool (CPU usage = 100%)

This benchmark was performed using PowerDVD 8.0 using the HDMI interface.

Test Condition	Volts	Amperes	Watts
Maximum	11.28	4.48	50.534
Average	11.28	3.84	43.315
Minimum	11.28	3.16	35.645

B.5.3. Power DVD 8.0 to Player H.264 1080i_10M Movie

Test Condition	Volts	Amperes	Watts
Maximum	11.58	3.96	45.857
Average	11.58	3.02	34.972
Minimum	11.58	2.00	23.160

B.5.4. Power DVD 8.0 to Player MPEG2 1080P_40M Movie

Test Condition	Volts	Amperes	Watts
Maximum	11.60	3.64	42.224
Average	11.60	2.42	28.072
Minimum	11.60	1.92	22.272

B.5.5. Idle at Windows XP

Test Condition	Volts	Amperes	Watts
Maximum	11.50	2.80	32.200
Average	11.50	1.99	22.885
Minimum	11.50	1.88	21.620

B.5.6. Suspend S1

Test Condition	Volts	Amperes	Watts
Maximum	11.75	1.524	17.907
Average	11.75	1.507	17.707
Minimum	11.75	1.496	17.578

B.5.7. Suspend S3

Test Condition	Volts	Amperes	Watts
Maximum	12.00	0.044	0.528
Average	12.00	0.042	0.504
Minimum	12.00	0.040	0.480

B.5.8. Suspend S4

Test Condition	Volts	Amperes	Watts
Maximum	11.99	0.064	0.767
Average	11.99	0.062	0.743
Minimum	11.99	0.060	0.719

B.5.9. Suspend S5

Test Condition	Volts	Amperes	Watts
Maximum	12.00	0.064	0.768
Average	12.00	0.058	0.696
Minimum	12.00	0.052	0.624

Appendix C.
VB8004-A Daughter Board

The VB8004-A daughter board has a Mini PCI Express slot and offers additional DVI-I connector and HDMI port that gives VB8004 mainboard ability to support a maximum up to four displays.

C.1. Specification

- **Graphics Processor Unit**
  - S3 5400E
- **Memory**
  - DDR3 512MB
- **Back Panel and Onboard I/O**
  - 1 x HDMI port
  - 1 x DVI-I port
  - 1 x Mini PCI Express slot (PCIe 1-Lane)

> **Note:**
>
> VB8004-A does not support 1600 x 1200 resolution

C.2. Layout Diagram

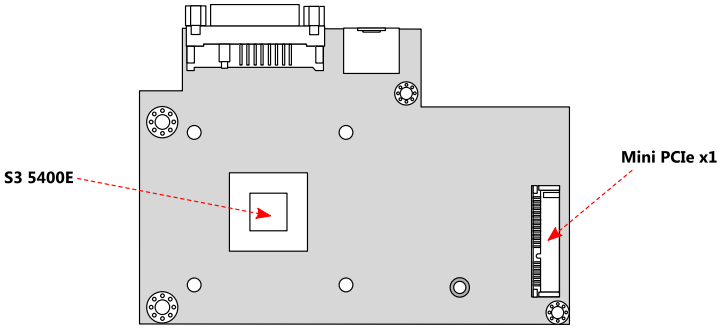


Figure 70: Daughter board top view layout

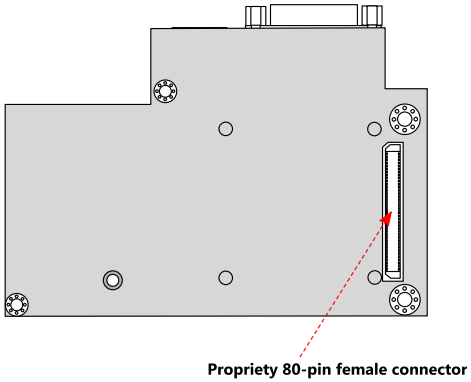


Figure 71: Daughter board bottom view layout

C.3. Dimensions

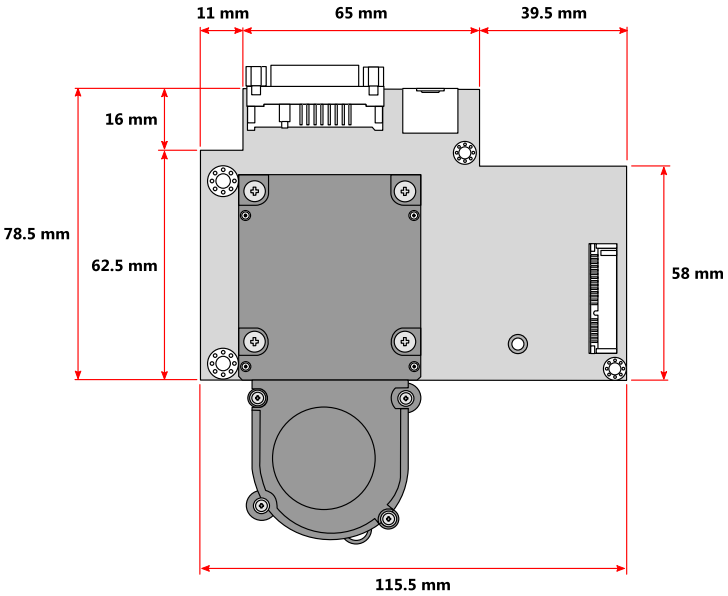


Figure 72: Daughter board dimensions

C.4. External I/O Ports

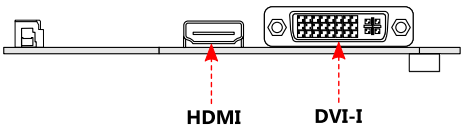


Figure 73: Daughter board External I/O layout

C.4.1. HDMI Port

Daughter board provides 19-pin HDMI port uses an HDMI Type A receptacle connector as defined in the HDMI 1.0 specification. The pinout of the HDMI port is as shown below.

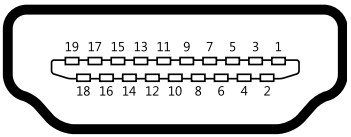


Figure 74: Daughter board HDMI port pinout diagram

C.4.2. DVI-I Connector

Daughter board supports 24-pin DVI-I connector that uses to interface with a high-speed, high resolution LCD or CRT displays for digital video output. The pinout of the DVI-I connector is as shown below.

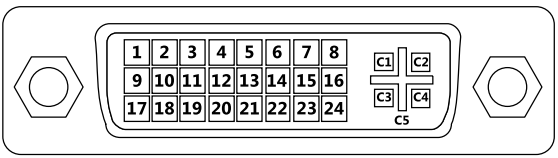


Figure 75: Daughter board DVI-I connector pinout diagram

C.5. Onboard Connectors

C.5.1. Mini PCI Express Slot

The Mini PCI Express slot labeled as "CN2" supports an optional WLAN or 3G/4G module.

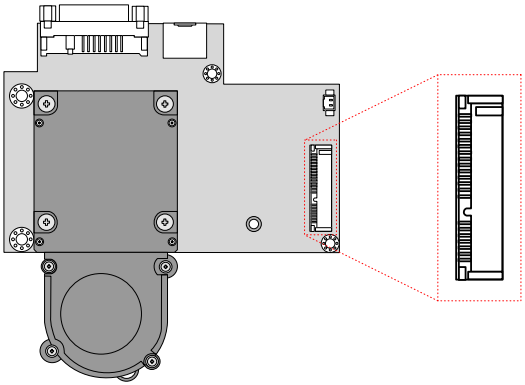


Figure 76: Mini PCI Express slot

C.5.2. Graphics Processor Fan Connector

The GPU fan connector on the daughter card labeled "J2" is for connecting the GPU fan to maintain the cooling of the S3 5400E graphics processor.

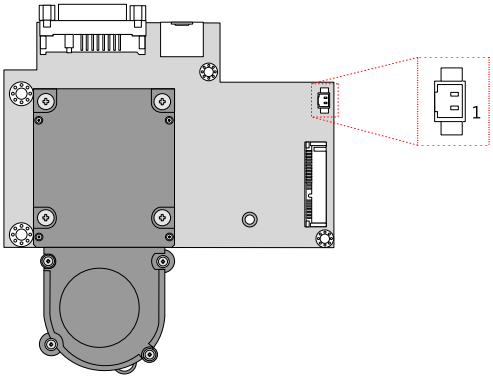


Figure 77: GPU Fan connector

C.5.3. Proprietary 80-pin female connector

The Proprietary 80-pin female connector labeled as "CN3" is located on the bottom side of the VB8004-A daughter board. The connector provides an interface to the VB8004 mainboard. The location of the 80-pin female connector is as shown below.

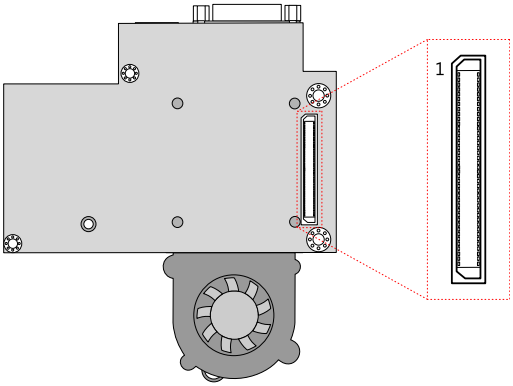


Figure 78: Proprietary 80-pin female connector